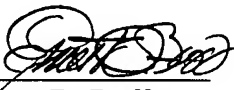


Applicant also submits herewith a detailed discussion of the references, which discussion particularly points out how the claimed subject matter is distinguishable over the references.

Enclosed herewith is a check in the amount of \$130, to cover the fee for this Petition. In the event that any additional fee is deemed to be required by 37 C.F.R. 1.17(h), it is requested that applicants be contacted at (973) 644-0008 and provided an opportunity to effect payment thereof.

A duplicate of this petition is attached.

Respectfully submitted,
Joseph Skiba

By 
Ernest D. Buff
(His Attorney)
Reg. No. 25,833
(973) 644-0008



Attorney Docket No.: 0133-1
IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: Joseph Skiba
Serial No.: 10/625,715
Filed: July 22, 2003
For: **"LIGHTWEIGHT IMPACT RESISTANT HELMET SYSTEM"**
Matter No.: 0133-1

Group Art Unit:
Examiner: N/A

Morristown, N.J. 07960
September 19, 2003

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Certificate of Mailing by First Class Mail

I hereby certify that this correspondence is being deposited with the United States Postal Service as First Class Mail in an envelope addressed to the Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on September 19, 2003.



Signature

Ernest D. Buff
Attorney of Record

September 19, 2003
(Date)



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: Joseph Skiba Group Art Unit:
Serial No.: 10/625,715 Examiner: N/A
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Morristown, N.J. 07960
September 19, 2003

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

**STATEMENT PERTAINING TO PRE-EXAMINATION SEARCH
IN ACCORDANCE WITH MPEP § 708.02(VIII)**

In accordance with MPEP § 708.02 (VIII), applicants, by and through their attorney, hereby submit that a pre-examination search was made for the above-identified application. The search was conducted by applicants' agents at the United States Patent and Trademark Office (the "Office"). The field of search covered Class 2, subclasses 267, 268, 410, 411, 412, 425 and 909. A computer database search was also conducted on the USPTO systems EAST and WEST. Examiner Rodney Lindsey in Class 2 (Art Unit 1765) was consulted in confirming the field of search. In addition, an assignment search was performed by Riddell, Schutt, Douglas and Adams at the Office. Copies of the references developed by the pre-examination search were submitted with applicant's Information Disclosure Statement dated September 9, 2003.



The search identified the following U. S. Patents:

UNITED STATES PATENTS

Ref. #	Patent No.	Inventor(s)
1	4,307,471	Lovell
2	4,370,754	Donzis
3	4,453,271	Donzis
4	4,466,138	Gessalin
5	4,581,776	Kie
6	4,985,931	Wingo
7	5,105,473	Valtakari
8	5,146,621	Hadar
9	5,353,437	Field
10	5,465,424	Cudney
11	5,493,736	Allison
12	5,561,866	Ross
13	5,729,830	Luhtala
14	5,790,988	Guadagnino
15	5,794,271	Hastings
16	5,857,215	Ferguson
17	6,012,178	Schuster
18	6,070,273	Sgro
19	6,131,207	Basson
20	6,154,889	Moore
21	6,298,483	Schiebl
22	6,397,402	Holland
23	6,499,147	Schiebl

Each of the foregoing references has been identified and discussed in the Detailed
Discussion of the References Submitted in Compliance with MPEP § 708.02(VIII).

Respectfully submitted,
Joseph Skiba


By 
Ernest D. Buff
(His Attorney)
Reg. No. 25,833
(973) 644-0008



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: Joseph Skiba Group Art Unit:
Serial No.: 10/625,715 Examiner: N/A
Filed: July 22, 2003
For: "LIGHTWEIGHT IMPACT RESISTANT HELMET SYSTEM"
Matter No.: 0133-1

Morristown, N.J. 07960
September 19, 2003

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

**DETAILED DISCUSSION OF THE REFERENCES SUBMITTED
WITH THE INFORMATION DISCLOSURE STATEMENT
IN COMPLIANCE WITH MPEP § 708.02 (VIII)**

In accordance with MPEP § 708.02(VIII), applicants hereby submit a detailed discussion of references applicable to the above-identified application. Each of these references was listed in the Information Disclosure Statement filed with the United States Patent and Trademark Office on September 9, 2003, in connection with the above-identified application.

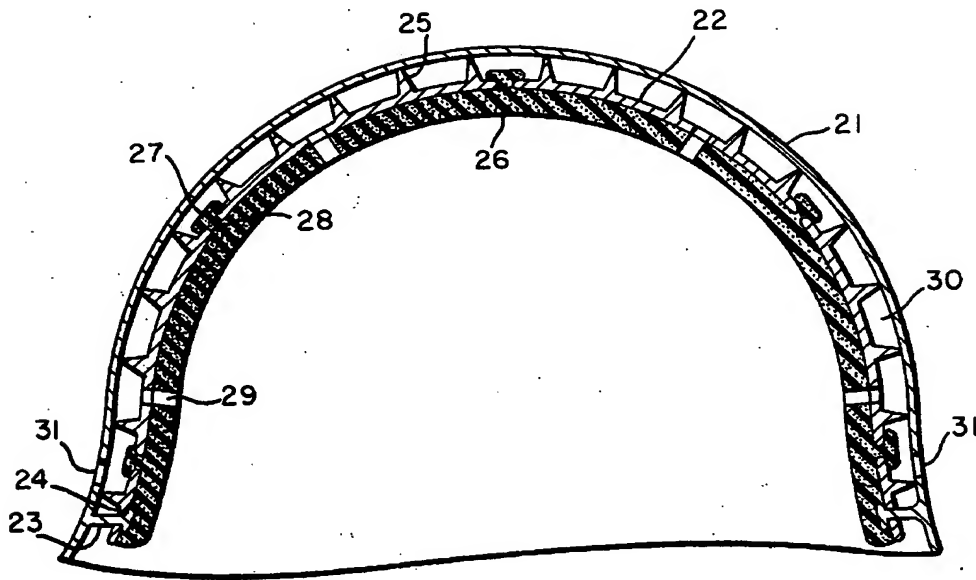
1. U. S. Patent No. 4,307,471 to Lovell

US Patent 4,307,471 to Lovell (hereinafter the '471 patent) discloses a protective helmet. The protective helmet has two shells, an inner shell and an outer shell, which slide with respect to each other. Such sliding action absorbs energy of impact. The inner and outer shells are slidably connected to each other in at least two locations juxtaposed to the edge of the outer section. The outer section is spaced apart

from the inner section away from these locations, with the outer section being adapted to move relative to the inner section on impact of an object with the outer shell. There may be a plurality of projections functioning at the above-described locations between the inner shell and the outer shell. These projections may be integral with either the inner or the outer shell so as to create a sliding action between the projections when impact occurs.

The '471 patent discloses a protective helmet with two shells fabricated from a variety of thermoplastic and thermoset polymers, including poly-alpha-olefins e.g. polypropylene, homopolymers of ethylene and copolymers of ethylene and other alpha-olefins e.g. butene-1 and vinyl acetate, and mixtures thereof; polyamides, especially polyhexamethylene adipamide and blends thereof with a compatible elastomeric or rubber material, polycarbonate, acrylonitrile/butadiene/styrene polymers; polyvinyl chloride; cellulose acetobutyrate; polybutylene terephthalate, polyoxymethylene polymers; polyester or epoxy polymers reinforced with glass or KEVLAR, aramid fibers, and the like. Preferably the polymer is selected so that injection molding techniques may be used in the manufacture of the helmet. The inner and outer shells can slide with respect to each other when the helmet is impacted, providing shock absorption due to sliding action. The figure below shows cushioning means 26, in the form of foam pads that are located on the inside of inner shell 22 attached by means of snaps 27 inserted through orifices 28 in inner shell 22. The helmet preferably has support means e.g. straps, adapted to position the helmet on a users head. The helmet may also have an attachment means e.g. a chin-strap, adapted to retain the helmet on the users head. The protective helmet shown in the figure below has an outer shell 21 with an inner shell 22 juxtaposed to essentially the entire

inner surface, with a series of projections at 25, made preferably from thermoplastic material.



By way of contrast, the football helmet of applicant's present claims 1-10 is made from a polymer material with reinforcement mesh or net on both inner and outer surfaces. Moreover, the applicant's football helmet set forth in present claims 1-10 is light in weight and strongly resists bending. Impact shock is efficiently absorbed due to increased area of contact produced between the inner surface of the helmet shell and the second inner pliable padded helmet by the flexing action of the light-weight helmet shell. Such flexing action, in turn, causes compression of the inner pliable padded helmet. The shock absorption mechanism in the football helmet of applicant's present claims 1-10 is a) flexing of a stiff thin reinforced polymeric helmet shell followed by b) impact energy absorption in a pliable padded inner

helmet. Such impact energy absorption clearly differs from the mechanism disclosed by the '471 patent, namely, use of sliding of inner and outer shells for energy absorption. The sliding mechanism disclosed by the '471 patent fails when the projections are worn out. Accordingly, the helmet disclosed by the '471 invention has a limited lifetime. When these projections are worn out, the user is unaware of the deprivation of impact protection offered by the helmet disclosed by the '471 patent. On the other hand, the football helmet of applicant's present claims 1-10 is inexpensive to construct and install. It exhibits an extended useful life, thereby affording increased protection to the wearer and opposing football players during game play.

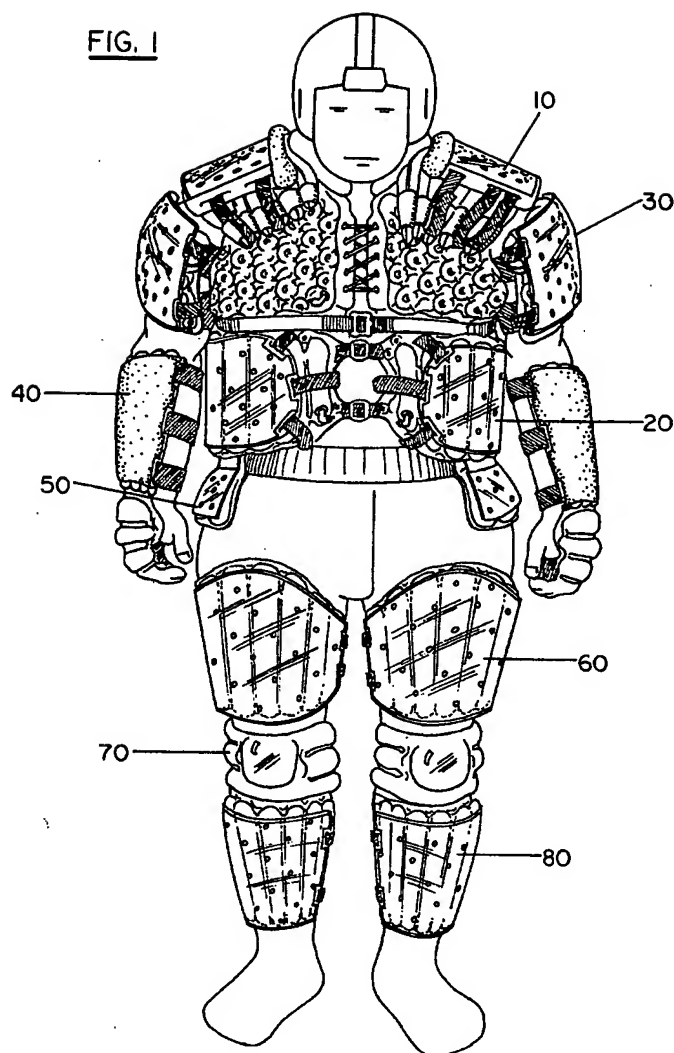
These structural differences patentably distinguish the applicant's football helmet delineated in present claims 1-10 from the '471 patent disclosure.

2. U. S. Patent No. 4,370,754 to Donzis

US Patent 4,370,754 to Donzis (hereinafter the '754 patent) discloses a variable pressure pad. The protective garment is primarily intended for use as protective athletic equipment and includes protective gear for the shoulders, ribs, biceps, forearms, thighs, knees and shins. This protective garment is composed of variable pressure pads, air cushions, and/or shields. Each of the variable pressure pads includes two superimposed plies of a lightweight, non-elastic fluid-impervious fabric material. Adjacent surfaces of the fabric material are sealed around the periphery to form a pressure tight inflatable garment, which does not distend. The internal fluid chambers are fluidly communicable with adjacent fluid chambers by means of the fluid passageways. The material crinkles and folds over at pre-selected regions to constrict fluid communication between the fluid chambers as an external force is applied to the

variable pressure pads. Air cushions, in the form of a plurality of tubular air chambers, are mounted on the variable pressure pads at certain critical locations to provide additional cushioning and dispersion of an external force over an area wider than the impact area. Shields are mounted over the variable pressure pads and/or air cushions to provide additional means for apportioning the external force. Vent holes are provided in the variable pressure pads and shields to permit the garment to breathe by permitting air to pass from the surface of the body and through the pads creating a chimney effect beneath the variable pressure pads.

This '754 patent discloses a variable pressure pad for a football player, as shown in the figure below. The protective athletic garment includes: shoulder pads 10, rib pads 20, bicep pads 30, forearm pads 40, hip pads 50, thigh pads 60, knee pads 70, and shin pads 80. It may also be adapted to pad other parts of the body such as padding in a football helmet to protect the head. The pads have three general parts, a variable pressure pad, an air cushion, and a shield. Each pad making up the uniform includes a variable pressure pad and may include an air cushion and/or shield to meet the needs of the individual player and to adapt it to the position that he plays.

FIG. 1

The variable pressure pads are illustrated below. Referring to the figure, variable pressure pad 14 comprises two superimposed plies 26, 28 of thin, lightweight, non-elastic, flexible, fluid-impervious woven fabric material. The shape of the fabric material generally conforms to the shape of each side of the upper torso of the body. Adjacent surfaces of plies 26, 28 are sealed at 32 around the periphery 34 of pad 14. Sealing is also effected at preselected regions 36 internally of periphery 34 to form a pressure type inflatable variable pressure pad which, when filled with fluid under sufficient pressure to adequately cushion the applied forces, does not

distend or lose its shape. Pad 14 may be pressurized with any suitable fluid, which is preferably air; but can possibly comprise another gaseous or liquid fluid. The fabric material for inflated pad 14 must have sufficient strength to be integral and self-supporting. At the same time, the material must be lightweight and flexible. The pad must be capable of retaining and supporting its own shape under the limited amount of internal fluid pressure to which it will be subjected during proper functioning. In other words, it must not stretch or "balloon" out of shape when providing a cushioning function, or when being subjected to sudden and sharp increases in internal pressure, as will be experienced during an athletic event. In addition, the pad 14 must be capable of supporting its own structure without being contained by some rigid supporting material. This last characteristic provides pad 14 with the valuable capability of being made to a precise shape. The preferred material for the manufacture of variable pressure pad 14 is a woven fabric of a suitably strong, non-elastic fiber, such as nylon, polyester, or aramid, made fluid-impervious by coating it on at least one side with a natural or synthetic elastomeric material, such as rubber, polyisoprene, or polyurethane. Other suitably strong, fiber materials may be square woven into a textile sheet material which is non-elastic and of sufficient strength to resist puncture.

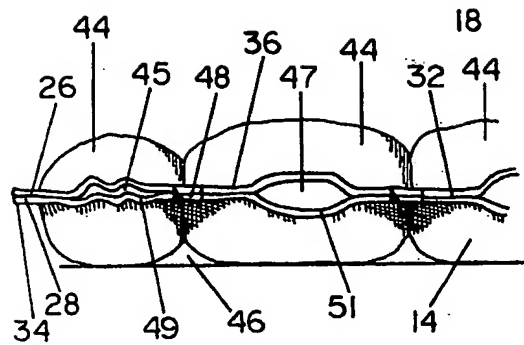


FIG. 4

The '754 patent discloses a variable pressure pad, which is incorporated in different portions of a body protection garment. It may be used as a shock-absorbing member within the shell of a football helmet. The variable pressure pad disclosed by the '754 patent is not a football helmet; it does not protect the wearer from injury, or protect other opposing players that are contacted by the helmet. By way of contrast, present claims 1-10 require use of a thin polymeric shell that is reinforced with mesh or net of long-length high strength fibers integrally bonded on both the inner and outer surfaces of the helmet shell. The stiff lightweight helmet shell thereby produced is resistant to bending and deformation. Energy is absorbed when the inner surface of the helmet shell contacts and compresses a second inner pliable padded helmet. Such features make the football helmet called for by present claims 1-10 inexpensive to construct and assemble. In addition, the football helmet required by applicant's present claims 1-10 exhibits an extended useful life. Increased protection is thereby afforded to the wearer as well as opposing football players during game play.

These structural and procedural differences patentably differentiate the

subject matter defined by applicant's present claims 1-10 from the '754 patent disclosure.

3. U. S. Patent No. 4,453,271 to Donzis

US Patent 4,453,271 to Donzis (hereinafter the '271 patent) discloses a protective garment. Such protective garment uses variable pressure pads, fluid passages, air cushions and shields to absorb impact shock. The '271 patent is a division of the '754 patent and the helmet structure disclosed therein is subject to the same problems as those discussed in connection with the '754 patent.

By way of contrast, the subject invention, as defined by present claims 1-10, uses a thin polymeric shell that is reinforced with mesh or net of long-length, high-strength fibers. Integrally bonded on both the inner and outer surfaces of the helmet shell the fiber mesh or net produces a stiff light-weight helmet shell that resists bending and deformation. Energy is absorbed when the inner surface of the helmet shell contacts and compresses a second inner pliable padded helmet. These features make the football helmet delineated by present claims 1-10 inexpensive to construct and assemble. In addition, the football helmet defined by applicant's claims 1-10 exhibits an extended useful life. Increased protection is thereby afforded to the wearer as well as opposing football players during game play.

These structural and procedural differences patentably differentiate the subject matter defined by present claims 1-10 from the '271 patent disclosure.

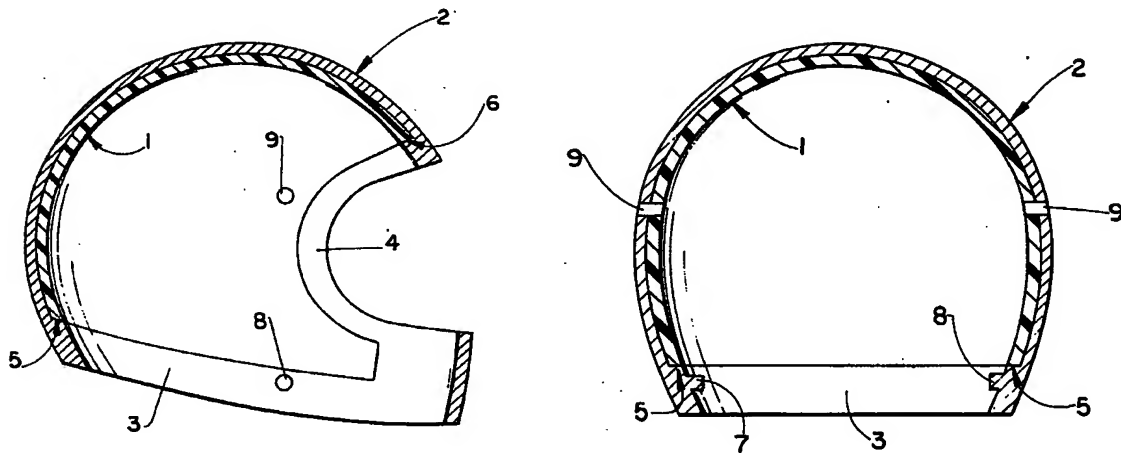
4. U. S. Patent No. 4,466,138 to Gessalin

US Patent 4,466,138 to Gessalin (hereinafter the '138 patent) discloses

a safety helmet for a vehicle rider. The helmet comprises a shell injected from thermoplastics. Also disclosed is a method for manufacture of the helmet. The helmet shell has a composite structure. It includes a rigid insert composed of a reinforced resin, and an outer casing composed of injected thermoplastics. The outer casing is molded onto the insert, which is embedded within the mass of the outer casing. After cooling, the helmet shell is pre-stressed by shoulders on overlapping portions of the casing.

The '138 patent discloses a safety helmet having a shell injected from thermoplastics and a method for manufacturing the shell. Referring to the Figure below, there is shown the shell of the protector helmet. The shell is a composite laminated structure. It consists of a rigid reinforced resin insert 1 over which an outer casing 2 of thermoplastics is directly injection molded. The rigid insert 1 is made of resin reinforced with glass fibers or any other fibers. Insert 1 has smaller dimensions than those of outer casing 2 and the outer casing has protruding portions 3 and 4 at the bottom of the helmet and along the front opening, respectively. Insert 1 is embedded into the injected mass of the outer casing 2. The projecting portions 3 and 4 of the outer casing 2 form all around insert 1 abutment shoulders 5 and 6, respectively, whereby insert 1 is retained within casing 2 by being set therein. During cooling after injection molding, the outer casing injected thermoplastics shrink. This produces a hooping effect on the inner insert 1. Such a hooping effect of outer casing 2 on insert 1 provides prestressing of the insert, which is kept captive along its edges by the peripheral shoulders 5 and 6 of the overlapping portions 3 and 4. The prestress produced in insert 1 assists stiffening of both the insert and the overall laminated shell. Outer casing 2 made of thermoplastics is molded integrally with lateral

protrusions 7 and 8, especially provided for securing, for instance, a chin-piece, a chin-strap and a visor. Holes 9 through insert 1 and casing 2 may also be provided by molding, said holes being used for example for the pivotal connection of the helmet visor.



The helmet disclosed by the '138 patent is especially suited for vehicle riders. It comprises a rigid helmet having a reinforced inner insert captured in an injection molded outer shell. The outer shell carries provisions for prestressing the inner shell and provides attachment points for a chin guard, visor or the like. The helmet disclosed by the '138 patent is not a football helmet, and provides visibility only in a very narrow region. By way of contrast, the subject invention, as defined by present claims 1-10, uses a thin polymeric shell that is reinforced with mesh or net of long-length, high-strength fibers. Integrally bonded on both the inner and outer surfaces of the helmet shell the fiber mesh or net produces a stiff lightweight helmet shell that resists bending and deformation. Energy is absorbed when the inner surface of the helmet shell contacts and compresses a second inner pliable padded helmet. These features make the applicant's claimed football helmet inexpensive to construct

and assemble. In addition, the football helmet called for by present claims 1-10 exhibits an extended useful life. Increased protection is thereby afforded to the wearer as well as opposing football players during game play.

In light of these structural and procedural differences, the football helmet of applicant's claims 1-10 patentably distinguishes the '138 patent disclosure.

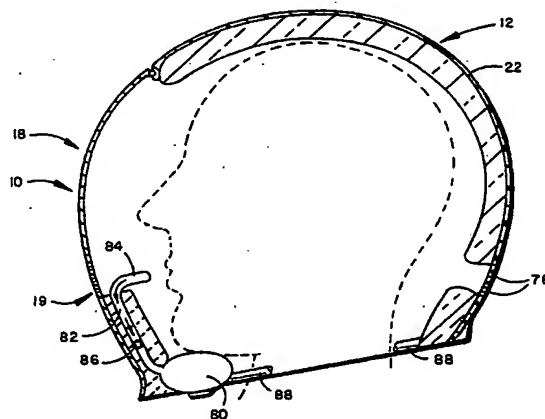
5. U. S. Patent No. 4,581,776 to Kie

US Patent 4,581,776 to Kie (hereinafter the '776 patent) discloses a motorcycle helmet. The motorcycle helmet has a sliding visor that moves on tracks on opposite sides of the eye area of a wearer's face. The visor slides relative to a casing which envelopes the back, side and crown of a wearer's head to selectively expose and shield the wearer's eyes. A chin guard is hinged to one side of the casing and a latch mechanism with a release actuator is located on the opposite side. An inflatable bladder, located within the chin guard, serves as a cushion and can be inflated by the user once the jaw guard is latched. Operation of the release actuator to unlatch the jaw guard causes the bladder to deflate.

The '776 patent discloses a motorcycle helmet, as shown in the figure below. The protective motorcycle helmet has a curved, hard casing 12 shaped to conform to the back, crown and sides of a human head. A pair of ear protecting sections are located on opposite sides of the casing 12. Parallel, arcuate tracks are defined at the interfaces of the ear protecting segments and the casing. The arcuate tracks are positioned to reside on opposite sides of the eye area of the human face. A sliding, plastic, transparent visor 18 is provided. The visor has opposite edges entrapped in the tracks. The edges of the visor 18 are reciprocally moveable in

tandem within the tracks so that the visor 18 slides in an arcuate path from the closed position. In this closed position, the eye area of a human face is shielded. The edges of the visor 18 are also movable to an open position adjacent to the forehead portion of the casing 12 to expose the eye area of a human face therebehind. The casing 12 includes a hard, outer shell 22 formed of polycarbonate plastic or Kevlar, which is a carbon composite. The first layer of padding beneath the shell 22 is formed of a soft pad of Styrofoam approximately one-half inch in thickness. A permanently sealed pneumatic bladder forms a further cushion approximately one-quarter inch in thickness interiorally of the semi-rigid Styrofoam pad. The innermost layer of padding is formed of cloth or foam approximately one-eighth inch in thickness. The minimum thickness of the structure of the helmet casing 12 is about one and one-quarter inches, and the maximum thickness of the shell and all layers of padding is about two and one-quarter inches.

The motorcycle helmet disclosed by the '776 patent has a visor in front



and a bladder chin rest to maintain the helmet in place. It is not a football helmet, and does not provide the visibility needed for a football player. By way of contrast, the

subject invention, as recited by present claims 1-10, uses a thin polymeric shell that is reinforced with mesh or net of long-length, high-strength fibers. Integrally bonded on both the inner and outer surfaces of the helmet shell the fiber mesh or net produces a stiff lightweight helmet shell that resists bending and deformation. Energy is absorbed when the inner surface of the helmet shell contacts and compresses a second inner pliable padded helmet. These features make the football helmet called for by applicant's claims 1-10 inexpensive to construct and assemble. In addition, the football helmet required by applicant's present claims 1-10 exhibits an extended useful life. Increased protection is thereby afforded to the wearer as well as opposing football players during game play.

These structural and procedural differences provide ample basis upon which to predicate patentability of the football helmet called for by present claims 1-10 over the '776 patent disclosure.

6. U. S. Patent No. 4,985,931 to Wingo

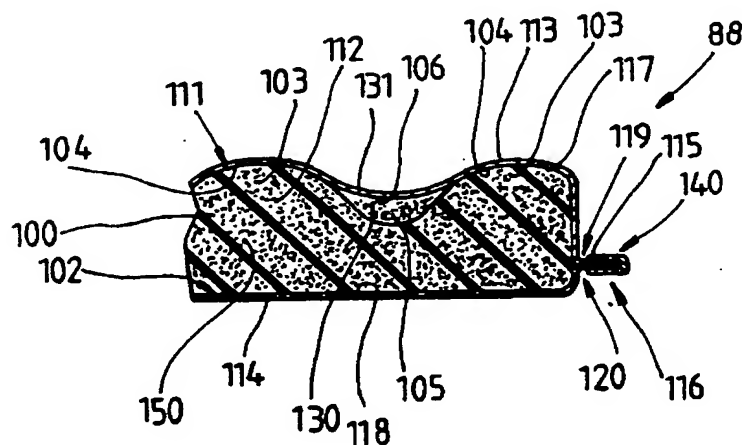
US Patent 4,985,931 to Wingo (hereinafter the '931 patent) discloses a shock absorbing pad structure for athletic equipment. The shock absorbing pad structure for athletic equipment, such as shoulder pads, has a foam member, having an undulated configuration formed by a plurality of elevations and depressions, arranged in a staggered relationship with respect to one another, disposed within a flexible, substantially air impermeable enclosure. The flexible enclosure has at least one air permeable portion disposed therein.

The '931 patent discloses a shock absorbing pad structure for athletic equipment. The Figure below shows a football shoulder pad with shock absorbing

elements. A shoulder pad 80 for a football player 81 (shown in dotted lines) is shown to generally comprise left and right body arch members 82, 83, each body arch member including depending chest portions 84, 85 and depending back portions (not shown), the shoulder pad being bilaterally symmetrical. Shoulder pad 80 also includes a pad body 87, or shock absorbing pad structure 88, disposed beneath the body arch members 82, 83. Body 87 of pad 80 is either fixedly secured, or releaseably secured, to body arch members 82, 83. The shoulder pad 80 may also be provided with conventional shoulder cups 89, which overlie the deltoid muscles of the football player 81, as well as conventional epaulets 90, which may be attached to the body arch members 82, 83. Body arch members may be permanently hinged together on a vertical axis over the football player's 81 back or spine. Chest portions 84, 85 are connected together on a vertical line over the football player's sternum as by a lacing 91 passing through lace openings 92 provided on the depending chest portions 84, 85 of body arch members 82, 83. Body arch members 82, 83 as well as shoulder cups 89 and epaulets 90 are made of any suitable material such as a suitable plastic having the requisite strength and rigidity requirements to withstand the forces of impact incurred in the sport of football. An impact force is initially inflicted and sustained by the body arch members 82, 83, or other rigid plastic part of shoulder pad 81 and the rigid plastic part serves to distribute and dissipate the impact force inflicted upon the shoulder pad 81 over the surface area of the pad body 87, or shock absorbing pad structure 88, disposed beneath the rigid plastic member, such as body arch members 82, 83.

Upon an impact force being applied to face 113 of shock absorbing pad structure 188, elevations 103, or compressible reservoirs 150, are compressed and the

air contained within compressible reservoirs 150 travels through foam member 100 in the following manner. Some of the air contained within each compressible reservoir 150 travels through the foam member 100 until it escapes through the at least one air permeable portion 116 of flexible enclosure 111. The escape of the air through air permeable portion 116 is restricted, because of the limited number of, and restricted size of the air passageways. Thus, not all of the air contained within compressible reservoirs 150, or flexible enclosure 111, can be released instantaneously, upon an application of a force. The air contained within compressible reservoirs 150 and flexible enclosure 111 thus reacts against the impact force, whereby it absorbs some of the energy from the impact force, and serves to cushion the impact force by spreading the force over the surface area of the shock absorbing pad structure 88, and by permitting the controlled release of the air within compressible reservoirs 150 and flexible enclosure 111 in a restricted manner through the at least one air permeable portion 116 of flexible enclosure 111.



The '931 device uses pads that contain foam pads which can selectively release air through a passageway to provide shock absorption. This protection device is not a football helmet and only protects shoulder, chest and other body portions of a football player. By way of contrast, the football helmet of present claims 1-10 uses a lightweight polymeric shell, which is reinforced by mesh or net of long-length, high-strength fibers. These fibers are integrally bonded to the inner and outer surfaces of the helmet shell, and provide improved resistance to flexure. Impact shock is absorbed by low curvature flexure of the helmet shell, which contacts and compresses a second inner pliable padded helmet. These features make the applicant's football helmet delineated in present claims 1-10 inexpensive to construct and assemble. In addition, the football helmet required by applicant's claims 1-10 exhibits an extended useful life. Increased protection is thereby afforded to the wearer, and to opposing football players during game play.

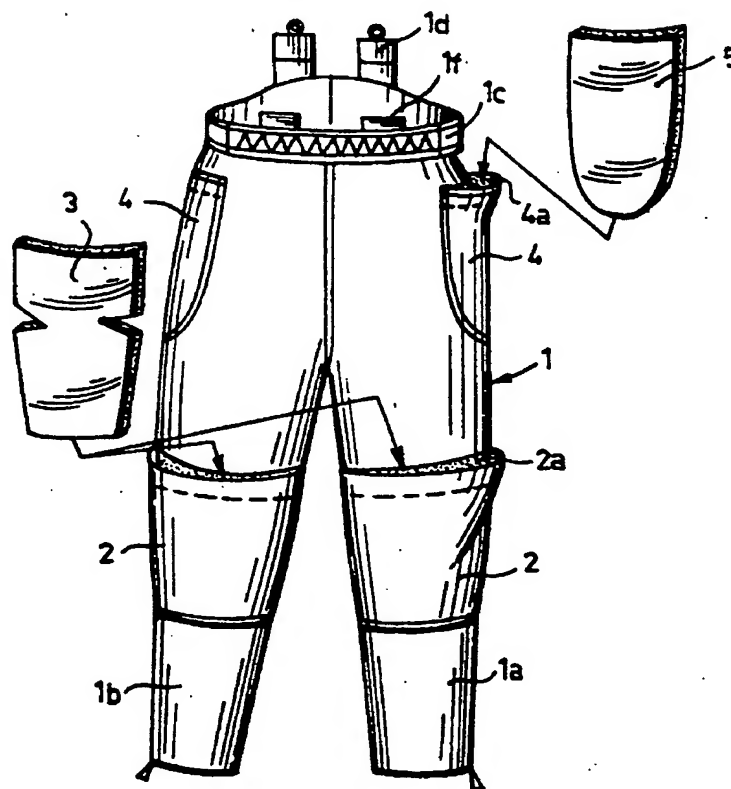
Based on these structural and procedural differences, patentability of the subject invention, as defined by present claims 1-10, over the '931 patent disclosure can be readily established.

7. U. S. Patent No. 5,105,473 to Valtakari

US Patent 5,105,473 to Valtakari (hereinafter the '473 patent) discloses a sports outfit having elastic fabric pockets for insertable resilient padding. An athletic garment for use in different sports includes trousers and/or a coat wherein outer pad pockets are attached. The pad pockets include hook and loop type closure tapes and are made of an elastic material, so that pads for the protection of the wearer can be inserted into and withdrawn from the respective pad pockets.

The '473 patent discloses a Sports outfit having elastic fabric pockets for insertable resilient padding. The Figure below shows the trousers 1 of the athletic outfit, comprising trouser legs 1a and 1b. The trousers further comprise a conventional waist member 1c usually comprising a rubber band or some other similar elastic member to provide elasticity, and fastening means by means of which the waist member can be opened and closed for taking off and putting on the trousers. The trousers may further comprise fasteners 1d and 1f for fastening the trousers 1 to the coat of the sports outfit or for suspending the trousers with braces. Various pockets for pads are provided on the outside of the trousers 1. In this Figure, the trouser knees are provided with pad pockets 2 having an openable opening at the upper edge. The edges of the openings are provided with VELCROX.RTM hook and loop tape closers 2a by means of which the pad pocket 2 can be closed firmly and reliably. When the pocket is open, a pad of desired size can be inserted into it. The reference numeral 3 indicates a light pad suitable for the athletic outfit. The pad 3 can be inserted into the pad pocket 2 through its opening, so that it substantially fills the pocket and is kept in position by the edges of the pocket. The pads 3 are made of a sheet of foamed or other similar elastic material such as felt, or a combination of different materials, which absorb shocks when compressed. The outer dimensions of the pads 3 are such that they can be passed into the pad pockets 2 in such a way that they bear against the edges of the pad pocket 2 on all sides, so that they cannot be displaced away from their normal position under stress. The trousers 1 further comprise pad pockets 4 in the area of the hips of the wearer. Similarly as the pad pockets 2, the pockets 4 are provided with VELCROX.RTM hook and loop tape closers 4a at the upper edge. The Figure also shows light pads 5 intended to be inserted into the hip pad pockets 4

through the opening at the upper edge of the pocket, after which the pad pocket is closed by the VELCRO.RTM hook and loop tape. The hip pads 5 may be composed of the same material as the kneepads 2, typically a foamed, fibrous, or other such sheet material. Alternatively, they can be composed of different materials according to the kind and strength of possible blows.



The '473 patent discloses pockets in a garment into which various pads can be inserted for absorbing impact shock. Such a device is not a football helmet. By way of contrast, the subject invention uses a thin polymeric shell that is reinforced with mesh or net of long-length, high-strength fibers. The fiber mesh or net is integrally bonded on both the inner and outer surfaces of the helmet shell, thereby

producing a stiff lightweight helmet shell that resists bending and deformation. Energy is absorbed when the inner surface of the helmet shell contacts and compresses a second inner pliable padded helmet. These features make the football helmet of applicant's claims 1-10 inexpensive to construct and assemble. In addition, the football helmet required by present claims 1-10 exhibits an extended useful life. Increased protection is thereby afforded to the wearer as well as opposing football players during game play.

These structural and procedural differences clearly predicate patentability of the applicant's football helmet delineated by present claims 1-10 over the '473 patent disclosure.

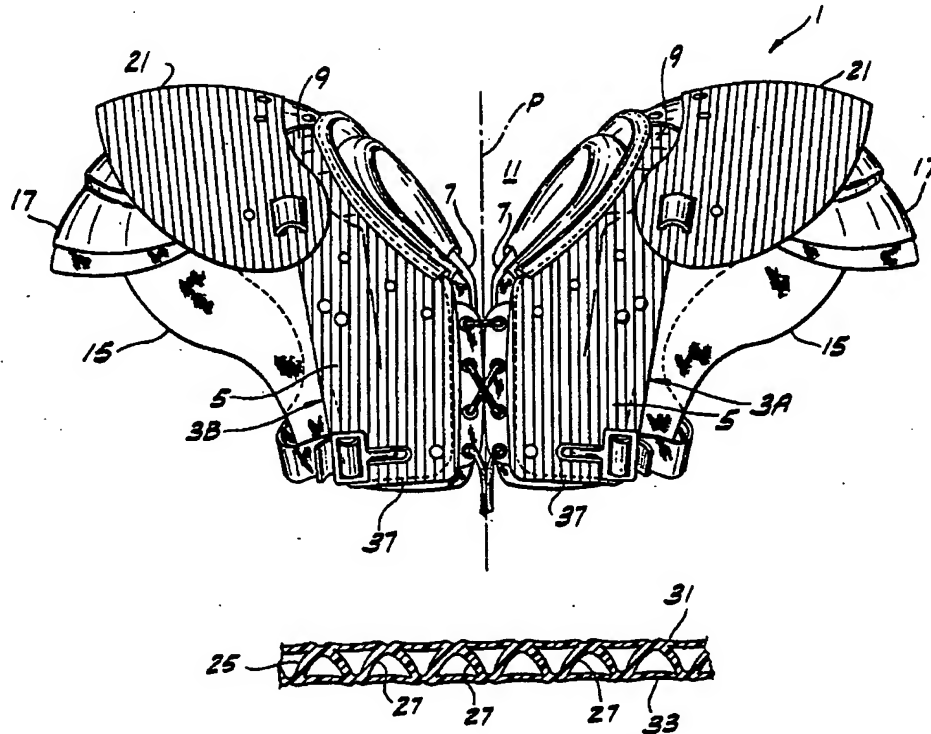
8. U. S. Patent No. 5,146,621 to Hadar

US Patent 5,146,621 to Hadar (hereinafter the '621 patent) discloses a shoulder pad. The shoulder pad has a left-hand member that fits over the left shoulder and a right-hand member that fits over the right shoulder. Each of the members has an inverted U-shape as viewed from the side. In addition, each member has a chest plate portion, a back plate portion and an arch connecting the plate portions. The arches are laterally spaced to provide an opening for the neck of the wearer. Each of the members is fabricated from lightweight synthetic resin sheet material having a corrugated central layer formed with parallel corrugations, and a pair of generally parallel outer layers forming opposite exterior surfaces of the sheet material. The corrugations are resiliently deformable upon application of an impact load to the sheet material to attenuate the shock of the impact load on the wearer.

The '621 patent discloses a shoulder pad, as shown in the figure below.

It shows at 1 a shoulder pad fabricated from corrugated sheet material, with a left-hand member designated 3A adapted to fit over the left shoulder and a right-hand member 3B adapted to fit over the right shoulder. These members combine to form what may be referred to as the shell of the shoulder pad. As viewed from the side of the shoulder pad, each of these members 3A, 3B is of inverted U-shape with planar chest plate portion 5, a planar back plate portion 7 (not shown) and a curved arch 9 connecting the plate portions 5, 7, the arches being laterally spaced to provide an opening 11 for the neck of the wearer. Each of the left-hand and right-hand members has padding 15 secured to an inside surface thereof for protecting the player, particularly, football players, or hockey players, or other players requiring substantial shoulder protection. The shoulder pad further comprises a shoulder cap 17 hinged to each arch 9 for overlying the outer portion of a respective shoulder, and a shoulder flap 21 hinged to each arch and adapted to overlie a respective shoulder cap to provide additional protection for the outer portion of the player's shoulder. Each of the left-hand and right-hand members 3A, 3b, of the shell, is fabricated from a lightweight sheet material of a suitable synthetic resin such as polyethylene, ABS (acrylonitrile butadiene styrene), polycarbonate or polypropylene. The second figure shows the construction of these pads. The sheet material has a corrugated central layer 25 formed with parallel corrugations 27, and a pair of parallel outer layers 31, 33 integrally formed with the central layer and forming opposite exterior surfaces of the sheet material. This corrugated construction is extremely lightweight to reduce the overall weight of the shoulder pad. Moreover, the corrugations 27 are resiliently deformable in a direction generally at right angles to the outer layers 31, 33 upon application of an impact load to the sheet material to more efficiently attenuate the

shock of the impact load on the player). Suitable corrugated sheet material of high density polyethylene useful in the fabrication of this shoulder pad is sold under the registered trademark "Corrulite" by United States Corrulite Corporation, having a place of business in Glewiston, Fla.



The '621 device uses shoulder pads which contain parallel elements with corrugated interior to absorb impact shock. The pad is comprised of several sections, which protect the left shoulder, left back, shoulder and right back. This protection device is not a football helmet; and only protects shoulder, chest and back portions of a football or hockey player. By way of contrast, the football helmet of applicant's claims 1-10 uses a thin polymeric shell that is reinforced with mesh or net of long-length, high-strength fibers. The fiber mesh or net is integrally bonded on both the inner and outer surfaces of the helmet shell, thereby producing a stiff

lightweight helmet shell that resists bending and deformation. Energy is absorbed when the inner surface of the helmet shell contacts and compresses a second inner pliable padded helmet. These features make applicant's claimed football helmet inexpensive to construct and assemble. In addition, the football helmet required by present claims 1-10 exhibits an extended useful life. Increased protection is thereby afforded to the wearer as well as opposing football players during game play.

These structural differences patentably differentiate the football helmet delineated by present claims 1-10 from the '621 patent disclosure.

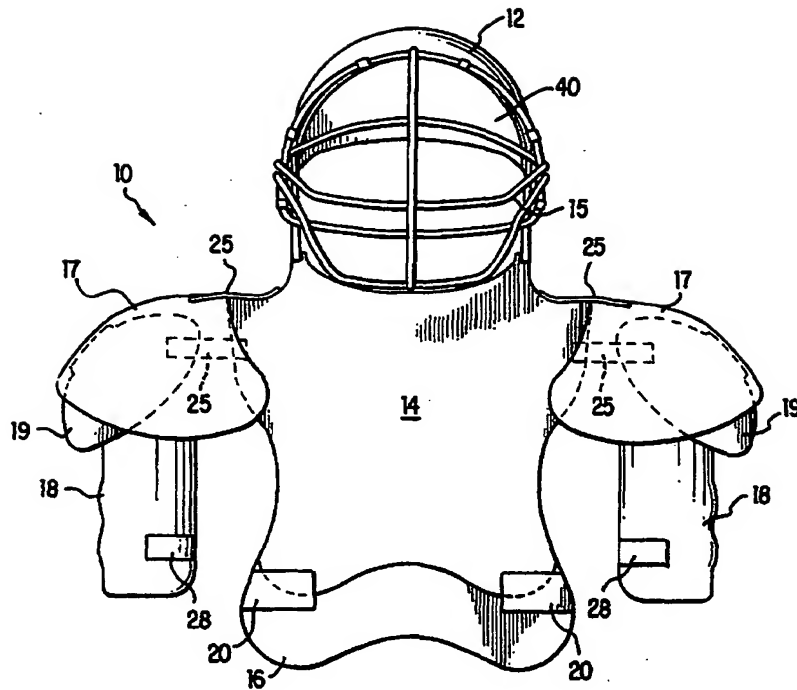
9. U. S. Patent No. 5,353,437 to Field

US Patent 5,353,437 to Field (hereinafter '437 patent) discloses a combination helmet and body protection device for use in football and other hazardous activities such as driving, cycling, hockey, riot control, and fire fighting to protect the human body from potentially crippling forces applied to the head and upper body. It has an upper torso section with internal padding, an outer helmet, which can be securely connected to the upper torso section so that the outer helmet cannot rotate with respect the torso section but can be easily removed for easy installation. It has an inner helmet section which fits securely on the wearer's head and which allows rotation of the wearer's head inside the outer helmet section.

The '437 patent discloses a combination helmet and body protection device, as shown in the Figure below. The front view of body protection unit 10 has a helmet 12, upper torso unit 14 and lower torso unit 16. Helmet 12 includes facemask 15 which is securely attached. Upper torso unit 14 includes upper shoulder shield 17 and shoulder guard 19. Also shown is upper arm pad 18, which may be securely

attached to shoulder guard 19 on both sides to afford protection to the upper arm of the wearer without limiting his mobility. This upper arm pad includes an arm strap 28, which extends entirely around the wearer's arm to securely mount the arm pad 18 and to prevent unwanted movement thereof. All of these shoulder and arm protection elements may be connected to the upper torso unit 14 through the use of standard rivets and straps 25, which may be made of webbing of, e.g., Dacron and/or leather. The upper torso unit 14 and lower torso unit 16 is a one-piece unit having a front and back portion, with an opening in between to enable the wearer to easily put on or remove the unit. A plurality of flexible, adjustable straps 20 connect the front and back portions of these two units to secure the entire unit on the wearer.

The helmet disclosed by the '437 patent is similar to helmets currently used in American football, with some significant exceptions. First, the face opening is much larger than current standard helmets to give the wearer a wider range of peripheral vision. Second, the face mask 15 extends up higher to provide full protection to the head and face, and it is secured by means of strong, flexible straps and can be cut to remove the face mask in an emergency. Third, the helmet incorporates a separate inner helmet section 40, which fits securely on the wearer's head and includes pads or bladders to absorb shock from direct blows to the head. The inner helmet 40 is placed within the outer helmet 12 and can rotate freely when the player turns his head, while the outer helmet remains fixed in position attached to the upper torso section rigidly.



The '437 disclosure uses an outer helmet that is rigidly attached to the upper torso unit and has a larger than average front opening. Within this outer helmet there is an inner padded helmet which is directly attached to the player's head. The gap between the outer and inner helmets allows the free rotation of the inner helmet when the player turns his head, and the larger opening in the outer helmet allows visibility. During direct impact, the inner helmet can absorb some of the shock. Since this helmet is directly connected to the upper torso, and a gap exists between the outer and the inner helmet, the outer helmet does not function to compress the inner helmet to absorb shock. Also, this rigid attachment of the outer helmet to the upper torso section makes this helmet a formidable weapon, which would likely injure other players that contact it during blocking or tackling events.

By way of contrast, the football helmet delineated by present claims 1-10 uses a thin polymeric shell that is reinforced with mesh or net of long-length, high-strength fibers. The fiber mesh or net is integrally bonded on both the inner and outer surfaces of the helmet shell, thereby producing a stiff lightweight helmet shell that resists bending and deformation. Energy is absorbed when the inner surface of the helmet shell contacts and compresses a second inner pliable padded helmet. These features make the football helmet called for by applicant's claims inexpensive to construct and assemble. In addition, the applicant's football helmet exhibits an extended useful life. Increased protection is thereby afforded to the wearer as well as opposing football players during game play.

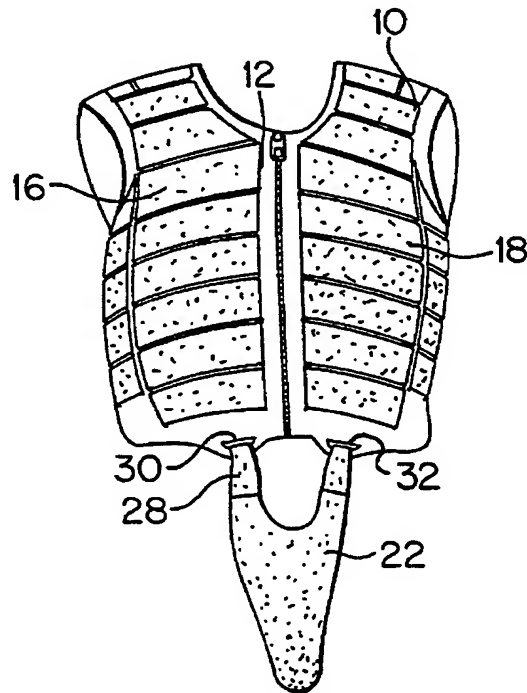
In view of these structural and procedural differences, the football helmet delineated by applicant's claims 1-10 and the '437 patent disclosure are patentably distinct.

10. U. S. Patent No. 5,465,424 to Cudney

US Patent 5,465,424 to Cudney (hereinafter the '424 patent) discloses a body protector with an articulated shock-absorbing vest for use in the equestrian sports. The vest is characterized by its capability of absorbing traumatic impact and crush, while not interfering with the movement of the equestrian rider's torso and arms. The vest includes a back panel and two adjoining side panels conformed to fit the human torso. Each panel includes a plurality of shock absorbing cellular foam ribs independently and movably supported in skeletal array. A protective spinal sheath is supported upon the back panel.

The '424 patent discloses a body protector, as shown in the figure below. The body protector is in the form of vest 10 formed by a flexible weave fabric and comprising

individual side panels 16, 18 removably joined by a zipper 12 along the vertical axis of the sternum. Vest 10 may be positioned and vertically tensioned by athletic supporter harness 22 extending from the back panel lower edge through the rider's legs for securing the lower edge front of the side panels 16, 18 by means of "Velcro" hook and loop type or similar type assembly 28.



This equestrian vest protects a horseback rider from injury to the chest and back portions. It is not a football helmet; and provides no protection for a player's head and other critical parts from injury during play.

By way of contrast, the football helmet defined by present claims 1-10 uses a thin polymeric shell that is reinforced with mesh or net of long-length, high-strength fibers. The fiber mesh or net is integrally bonded on both the inner and outer surfaces of the helmet shell, thereby producing a stiff lightweight helmet shell that resists bending and deformation. Energy is absorbed when the inner surface of the

helmet shell contacts and compresses a second inner pliable padded helmet. These features make the football helmet of applicant's claims 1-10 inexpensive to construct and assemble. In addition, the football helmet required by applicant's claims 1-10 exhibits an extended useful life. Increased protection is thereby afforded to the wearer as well as opposing football players during game play.

These structural and procedural differences strongly support patentability of applicant's claimed football helmet over the '424 patent disclosure.

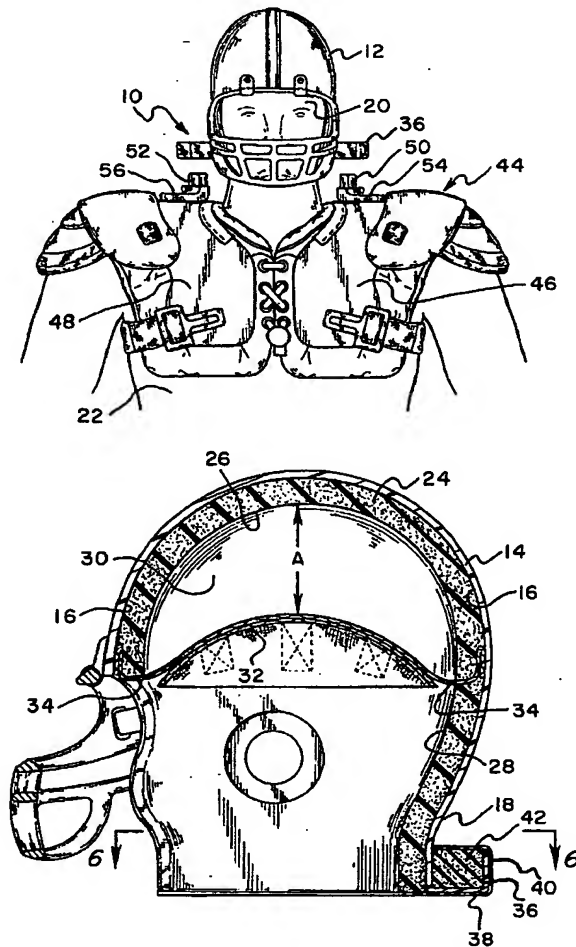
11. U. S. Patent No. 5,493,736 to Allison

US Patent 5,493,736 to Allison (hereinafter the '736 patent) discloses a sports helmet protective device. A modified football helmet has an inner cap attached by elastic straps to the inside of the helmet shell, providing a space above the cap. The helmet is further modified, incorporating a rigid collar extending outwardly from the bottom of the helmet which has a lower surface positioned a distance above two upright post members extending upwardly from the rigid shoulder pads.

The '736 patent discloses a sports helmet protective device in the Figures shown below. It is a modified helmet having upright posts, one on each shoulder that connects to the helmet to distribute the impact force to the shoulders of the user. Helmet 12 includes shell 14 constructed of high impact polymeric plastic such as ABS copolymer, polypropylene, polycarbonate, or like tough polymeric plastic materials. The shape of shell 14 has an increased height and an enlarged interior cavity within the shell compared with standard football helmets. The shell includes inside surface 16 to which standard foam padding 24 is adhesively attached. Padding 24 essentially protects the head from reaching the inside surface of the shell without compressing the foam. Shell 14 also includes lower section 18, which continues

around the lower portion of the shell on both sides and in the rear. Interior cavity 30 is bounded by side padded interior surface 28 which extends around the sides and in the rear of the helmet. Cavity 30 is also bounded by upper padded interior surface 26, which extends over the upper portion of the helmet. Head 20 of person 22 rests against surface 28, the padding of the side padded interior surface, but the upper portion of head 20 does not touch surface 26. Cap 32 is constructed of breathable fabric or a plastic configuration and may or may not be elastic in nature. It is preferred that all the elasticity be obtained through elastic straps 34, which are attached around the periphery of cap 32 to inside surface 16 of section 18 of the shell. Attachment of strap 34 is made to the inside of shell 14 on the same side of the strap that is attached to cap 32. The composition and structure of straps 34 are chosen to provide substantial elastic resistance to upward movement of the person's head. The resistance is chosen to provide sufficient resistance that the head will not move upwardly to reach surface 26 except in the most severe blows. More specifically, the resistance will largely prevent upward movement of the person's head as a result of sideway blows to the helmet. However, the elastic resistance is intended to allow for a major movement of the cap upwardly when the blow is severe and directed downwardly on the top of the helmet. When the helmet is worn, the distance between the top of the cap (essentially the top of the head) and upper surface 26 is depicted as distance "A" and this distance is about three inches. Annular collar 36 is formed as an integral extension of helmet shell 14 extending horizontally outwardly from lower section 18 to the sides and to the rear of the helmet. The horizontal width of collar 36 varies and is longest (about two inches) to the sides as the outside edge of the collar is circular and is only open to the front of the helmet. Collar 36 has lower horizontal surface 38 which contacts posts 50 and 52 when a hard blow is struck to the top of helmet 12. Foam core 42 is placed inside the cup-shape of collar 36 and the entire collar is covered with fabric 40 to simulate the common collars used by football players.

Shoulder pads 44, have several common elements of the standard football shoulder pad unit. Shoulder pads 44 include left rigid panel 46 and right rigid panel 48, each formed to fit over the wearer's shoulders extending frontwardly to the chest and rearwardly to the back of the wearer. The material is of rigid plastic or like material that will distribute force applied directly downwardly to a relatively large area of the wearer's body.



The '736 sports helmet uses a larger and deeper padded helmet designed in a manner that the user's head contacts the helmet sides only with a gap of 3" between the top of the user's head and the inner shell of the helmet. The user also wears a cap made from shock absorbing material. The top portion of the head of the user never contacts under the most severe blows to the helmet and this is accomplished by having a collar on the helmet which contacts two

rigid posts attached to the shoulder pad during severe blows. The helmet is only held in place by friction between the helmet and sides of the user's head with the attached cap. During ramming of the helmet, the helmet collar will contact the posts, delivering significant ramming force that is likely to injure other players.

By way of contrast, the football helmet called for by present claims 1-10 uses a thin polymeric shell that is reinforced with mesh or net of long-length, high-strength fibers. The fiber mesh or net is integrally bonded on both the inner and outer surfaces of the helmet shell, thereby producing a stiff lightweight helmet shell that resists bending and deformation. Energy is absorbed when the inner surface of the helmet shell contacts and compresses a second inner pliable padded helmet. That is to say, shock is absorbed by low curvature flexure of the helmet shell, which contacts and compresses a second inner pliable padded helmet. Significantly, the inner pliable padded helmet is always in contact with the interior of the helmet shell. These features make the football helmet of applicant's claims 1-10 inexpensive to construct and assemble. In addition, the football helmet of the subject application exhibits an extended useful life. Increased protection is thereby afforded to the wearer as well as opposing football players during game play.

In view of these structural and procedural differences the football helmet of applicant's claims patentably defines over the '736 patent disclosure.

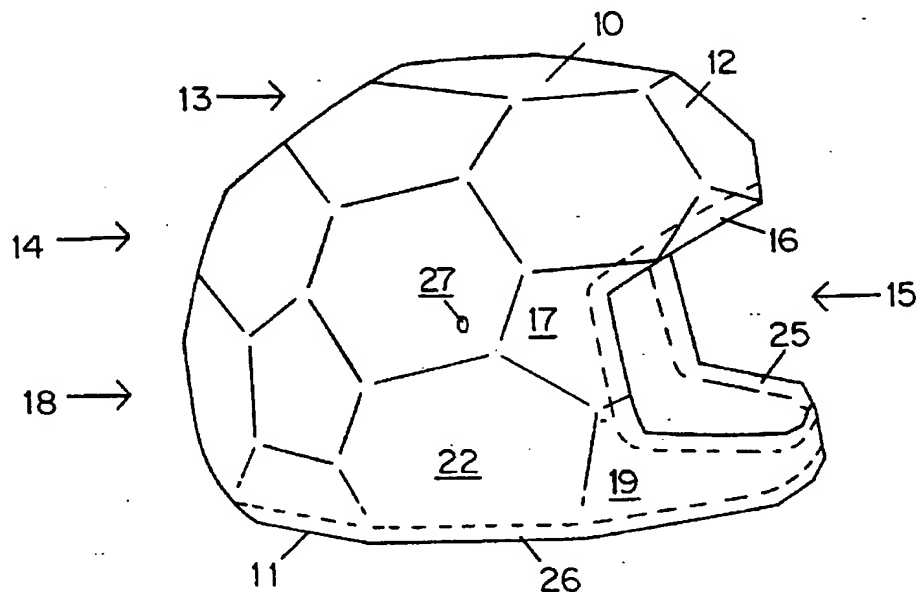
12. U. S. Patent No. 5,561,866 to Ross

US Patent 5,561,866 to Ross (hereinafter the '866 patent) discloses safety helmets for motorcyclists and has its outer shell formed as a sandwich, with outer and inner composite layers made from impact-resistant material with resin and are separated from each other by an intermediate layer of resilient material. The impact-resistant material is preferably a cloth of high tensile strength fiber such as

KEVLAR™, DYNEMA™, glass fiber, or carbon fiber. The resilient material may be cork or foamed or other resilient plastic material, but is preferably honeycomb material of paper or aluminum. The helmet is made by sequentially laying up, in or over a former, a first composite layer of resin and sheets of impact-resistant material, an intermediate layer of honeycomb material, and a second composite layer of resin and sheets of impact-resistant material. The outer shell has a polyhedral form with a plurality of polygonal faces having abutting edges.

The '866 patent discloses safety Helmets having the outer shell formed as a sandwich. Outer and inner composite layers of the sandwich are made from an impact-resistant material. The inner and outer layers are separated by an intermediate layer of resilient material having a polyhedral form. The outer shell is a sandwich, comprising outer and inner composite layers each composed of resin and impact-resistant material separated by an intermediate layer of resilient material. The impact-resistant material may be a cloth of KEVLAR™, DYNEMA™, glass fiber, or carbon fiber. The resilient material may be cork or foamed or other resilient plastics material, but is preferably honeycomb material of paper or aluminum. The helmet has a downward opening, so that it can be lowered onto the user's head. The mould is obviously made in the shape of the helmet, with a downward opening corresponding to the downward opening of the-helmet. This allows the various layers or shells of the helmet structure to be inserted into the mould during the laying up of the helmet. Crash helmets normally extend down around the user's head so that the head is almost completely enclosed, and therefore also normally have a visor opening to allow the user to see out. For the present crash helmet, the mould is preferably made to match the intended shape of the helmet without a visor opening, i.e. consisting of a spheroid with only the base opening which allows the entry of the user's head. The helmet is therefore laid up in the mould as a spheroid with only the base opening, which allows the entry of the user's

head. The visor opening is then cut out after the shell structure has been formed, either before or after curing. Edgings are then added around the edges of both the head opening and the visor opening, and glued in position to give a finished appearance and protect the exposed edges of the honeycomb material. The helmet may also be provided with an inner support or lining of webbing or other resilient material. The primary function of this inner lining is to give a comfortable fit to the user's head, though it will also provide a further cushioning and spreading effect on any sharp blow to the shell.



The '866 patent discloses a safety helmet for motor cyclists. It uses a helmet shell as a composite structure with an outer layer and an inner layer, each of which is laid as a composite material with layers of high strength fibers such as of KEVLAR™, DYNEMA™, glass fiber, or carbon fiber in the form of cloth and bonded using resin. In between the outer and inner layers, there is an intermediate layer of resilient material made in the form of polyhedral structure. Presence of high strength outer and inner layers sandwiched with a resilient layer allows movement of the outer and inner layers; but this process does not absorb impact shock.

The thin outer layer may crack under impact load. The device disclosed by the '866 patent is not a football helmet.

By way of contrast, the football helmet of applicant's claims 1-10 uses a thin polymeric shell that is reinforced with mesh or net of long-length, high-strength fibers. The fiber mesh or net is integrally bonded on both the inner and outer surfaces of the helmet shell, thereby producing a stiff lightweight helmet shell that resists bending and deformation. Energy is absorbed when the inner surface of the helmet shell contacts and compresses a second inner pliable padded helmet. That is to say, shock is absorbed by low curvature flexure of the helmet shell, which contacts and compresses a second inner pliable padded helmet. Significantly, the inner pliable padded helmet is always in contact with the interior of the helmet shell. These features make the football helmet of present claims 1-10 inexpensive to construct and assemble. In addition, the football helmet required by applicant's claims exhibits an extended useful life. Increased protection is thereby afforded to the wearer as well as opposing football players during game play.

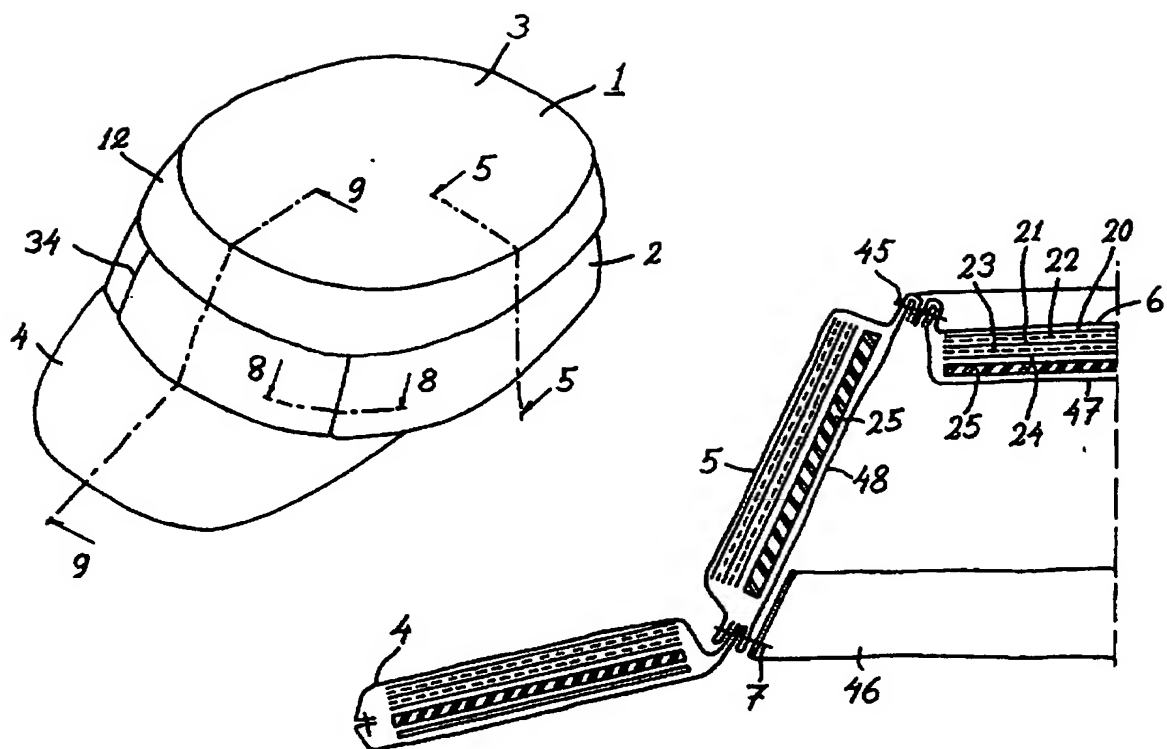
These structural differences patentably differentiate the applicant's claimed football helmet from the '866 patent disclosure.

13. U. S. Patent No. 5,729,830 to Luhtala

US Patent 5,729,830 to Luhtala (hereinafter the '830 patent) discloses a headgear that provides protection against ballistic projectiles. The headgear is adapted for use where a helmet is inappropriate or where the headgear is designed not to differ in appearance from conventional headgear. The problem is solved by providing a protection headgear 1 in which the protection structures are composed of flexible protective and damping layers 20-25, the headgear's 9 outer and inner surface materials 5, 6, 53; 48, 47, 54, 61 include protection

structures which may be removable 15, 33, 39, a visor 4 being able to comprise the protection structure.

The '830 patent discloses a protection headgear. The Figure below illustrates the protection headgear, which resembles a hat but provides protection. The protection headgear 1 comprises three main parts. A mantle part 2 surrounds the wearer's head. The mantle has the form of a cylinder or truncated cone. It has a top part 3 at the highest point, and a visor 4. A band 12 surrounds the upper part of the mantle part 2, from the top part's 3 outer edge downwards. The band 12 is fixed to the protection headgear only along its upper edge. As is seen in the figure below, the protection headgear 1 may also have protective and damping layers 20-25. These damping layers 20-25 are arranged directly in a pocket member, which consists of an outer fabric 5 and a fabric 48. The fabrics 5, 48 are joined together at their lower and upper edges by stitches 7, 45. This arrangement may be defined as well so that the fabrics 5, 48 establish a pocket-like positioning room for the protective and damping layers 20-25 and, at the same time, act as the protection headgear's outermost cover fabric and as the innermost fabric next to the user's head. A sweatband 46, may optionally be arranged to the headgear. A structural part that corresponds to the sweat band 46 may be arranged into the protection headgear by folding one or some of the fabrics inwards and upwards and by providing this fold with the necessary width.



Section 99

The '830 patent disclosure describes a protection headgear that does not look like a helmet; but more likely resembles a hat with a visor. The top portion, rim portion and visor portion are protected with a band, protective and damping layers. The '830 patent does not disclose a football helmet, and the protection headgear described therein cannot be worn on a football field. Such headgear is not firmly attached to the user's head.

By way of contrast, the football helmet of present claims 1-10 uses a thin polymeric shell that is reinforced with mesh or net of long-length, high-strength fibers. The fiber mesh or net is integrally bonded on both the inner and outer surfaces of the helmet shell, thereby producing a stiff lightweight helmet shell that resists bending and deformation. Energy is absorbed when the inner surface of the helmet shell contacts and compresses a second inner pliable padded helmet. That is to say, shock is absorbed by low curvature flexure of the helmet

shell, which contacts and compresses a second inner pliable padded helmet. Significantly, the inner pliable padded helmet is always in contact with the interior of the helmet shell. These features make the football helmet required by applicant's claims 1-10 inexpensive to construct and assemble. In addition, the applicant's football helmet exhibits an extended useful life. Increased protection is thereby afforded to the wearer as well as opposing football players during game play.

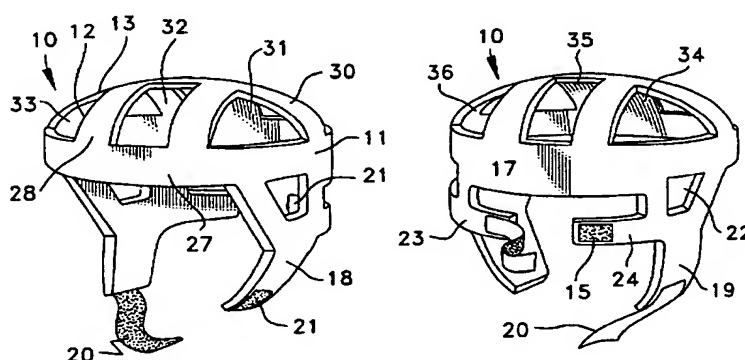
These structural differences patentably differentiate applicant's football helmet, as defined by present claims 1-10, from the '830 patent disclosure.

14. U. S. Patent No. 5,790,988 to Guadagnino

US Patent 5,790,988 to Guadagnino (hereinafter the '988 patent) discloses a protective headgear. A lightweight protective headgear for athletes and persons involved in activities involving a high falling risk. The protective headgear of this invention comprises a one-piece body of form-molded soft resilient closed cell foam material covered with a tough pliable surface coating having a double securing feature i.e. under the chin of the user and at the back of the head and when adjusted in position will stay fixed throughout usage. The protective headgear also provides adequate ventilation through spaces in the tip portion. .

The '988 patent discloses a protective headgear made from resilient closed cell foam material covered with pliable surface coating. In the Figure below the helmet concept is illustrated. The Protective headgear 10 comprises a one-piece body of form-molded foam 12 covered with a tough pliable surface coating 13. Headgear 10 defines the following members: a horizontal band 11, and a top portion 30 comprising two spaced parallel longitudinal bands 27 and 28 intersected by a central cross member 29 each of which members are integral, flexible to each other and elastically connected to each other. The configurations of the longitudinal bands

27 and 29 and cross member 30 are adapted to retain the helmet on the top of the person's head, providing openings 31, 32, 33, 34, 35 and 36 in the top of the headgear. These openings provide adequate ventilation and comfort to the wearer of the headgear 10 while the cross members provide protection to the occipital region of the head. Suitable resilient plastic materials are polystyrene or polyurethane foam or a synthetic rubber foam, etc. capable of absorbing energy. Suitable plastic coatings include thermosetting resins, phenolic resins, amino resins, polyester resins, epoxy resins, rigid foams of polyurathane, silicone polymers alkyl resins. Suitable thermo plastic coatings such as acrylic resins and polyvinge chloride are also useful. It is also contemplated within the concept of the invention that there be used materials such as nylon and KEVLAR (marketed by E. I. duPont de Nemours & Co., Inc., Wilmington, Del.). The unique construction and design of the headgear provides protection to the head in various contact sports such as youth football, where the necessity for a conventional football helmet may be obviated. In such sports, the collision forces involved are generally much lower for children under thirteen.



The '988 patent disclosure discusses a very low duty protective headgear for youths not involved in high-risk sports. Such headgear comprises a closed cell foam resilient material covered with a pliable smooth coating. The protective headgear disclosed by the '988 patent does not constitute a football helmet. By way of contrast, the football helmet of present

claims 1-10 uses a thin polymeric shell that is reinforced with mesh or net of long-length, high-strength fibers. The fiber mesh or net is integrally bonded on both the inner and outer surfaces of the helmet shell, thereby producing a stiff lightweight helmet shell that resists bending and deformation. Energy is absorbed when the inner surface of the helmet shell contacts and compresses a second inner pliable padded helmet. That is to say, shock is absorbed by low curvature flexure of the helmet shell, which contacts and compresses a second inner pliable padded helmet. Significantly, the inner pliable padded helmet is always in contact with the interior of the helmet shell. These features make the football helmet required by applicant's claims 1-10 inexpensive to construct and assemble. In addition, the applicant's football helmet exhibits an extended useful life. Increased protection is thereby afforded to the wearer as well as opposing football players during game play.

These structural distinctions patentably differentiate the football helmet of applicant's claims 1-10 from the '988 patent disclosure.

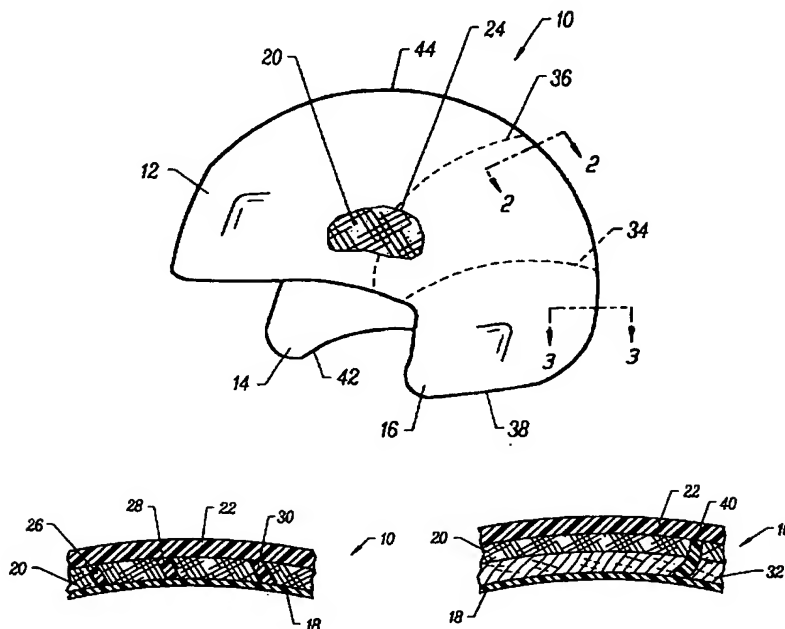
15. U. S. Patent No. 5,794,271 to Hastings

US Patent 5,794,271 to Hastings (hereinafter the '271 patent) discloses a helmet shell structure utilizing a first inner layer of epoxy resin shaped into a head covering of a desired size and configuration. A second layer of woven fabric is placed atop the first layer of epoxy. A third outer layer of epoxy resin is laid atop the second layer and is cured to a transparent state such that the second layer of woven fabric is visible through the third outer layer of cured epoxy.

The '271 patent discloses a helmet shell structure as illustrated at 10 in the Figure below. The helmet shell 10 is shaped into a hemispherical configuration having a portion 12 which covers the head of the user and distending flanges 14 and 16 which cover the ears of the user. The shell 10 is formed by a first inner layer of epoxy resin 18 which is formed over a mold

constructed of steel, composite, or other materials to produce the configuration and size of shell 10. In the normal course of molding, the mold is waxed to release first layer 18 therefrom when it has hardened. Shell 10 may be employed with face shields and fastening straps for use as a vehicle helmet. A second layer 20 of woven fabric material, which is positioned atop the first layer of epoxy. Second layer 20 may take the form of strong artificial fibers, such as carbon fiber, KEVLAR, an aramid based polymer, combinations of these two, and the like. Second layer 20 may be placed above first inner layer 18 when first inner layer is tacky or when first inner layer 18 is completely cured, of course, second inner layer 20 may be fitted by cutting or shearing such material from a sheet of material as needed. Third layer 22 is laid atop second layer 20. Third layer 22 consists of an epoxy resin which is cured to a hardened transparent state. Thus, the user is able to look through third layer 22 after it is cured and observe the state of second layer 20 thereunder. In addition, epoxy resin from third layer 22 penetrates second layer 20 during the curing process of third layer 22. Epoxy plugs 26, 28, and 30 are depicted to schematically represent such penetration. It has been found that epoxy flowing from third layer 22 through second layer 20 completely saturates second layer 20 to form an integral shell 10. The structure of flange 16 is represented by the Figure below. Such structure includes first inner layer 18, second layer 20 and third outer layer 22, which are essentially identical to those depicted for the helmet shell. Fourth layer 32 has been added in the form of a fiberglass glass material. Dashed lines 34 and 36 illustrate possible perimeters for the use of fourth layer 32. In other words, fourth layer 32 may be interposed first layer 18 and second layer 20, which begin at the lower edge 38 of flange 16 and extend up to dashed line 34 or dashed line 36. Fourth layer 32 increases the impact resistance of helmet shell 10 in areas, which are considered critical for protection during a crash. It should be noted that flange 14 includes a similar structure to that shown for flange 16. Epoxy plug 40 is schematically representative of the penetration of the epoxy flowing from third

outer layer 22, during the curing process, through second layer 20 and fourth layer 32. Epoxy from the third layer 22 completely saturates second layer 20 and fourth layer 32 to form an integral flange 16, which is a portion of helmet shell 10.



The '271 disclosure details helmet shell structure for crash helmets. Such crash helmets are formed by a first epoxy layer, a second layer of woven fabric followed by a third layer of transparent epoxy. Plugs composed of epoxy are used to maintain integrity of the three layers. Critical areas of the helmet, such as flanges, receive a fourth layer of fiberglass adjacent to the first layer. The crash helmet disclosed by the '271 patent is not a football helmet; and cannot be worn on a football field due to its reduced visibility and lack of chin protection.

By way of contrast, the football helmet of applicant's claims 1-10 uses a thin polymeric shell that is reinforced with mesh or net of long-length, high-strength fibers. The fiber mesh or net is integrally bonded on both the inner and outer surfaces of the helmet shell, thereby producing a stiff lightweight helmet shell that resists bending and deformation. Energy is absorbed when the inner surface of the helmet shell contacts and compresses a second inner pliable padded helmet. That is to say, shock is absorbed by low curvature flexure of the helmet

shell, which contacts and compresses a second inner pliable padded helmet. Significantly, the inner pliable padded helmet is always in contact with the interior of the helmet shell. These features make the applicant's claimed football helmet inexpensive to construct and assemble. In addition, applicant's football helmet exhibits an extended useful life. Increased protection is thereby afforded to the wearer as well as opposing football players during game play.

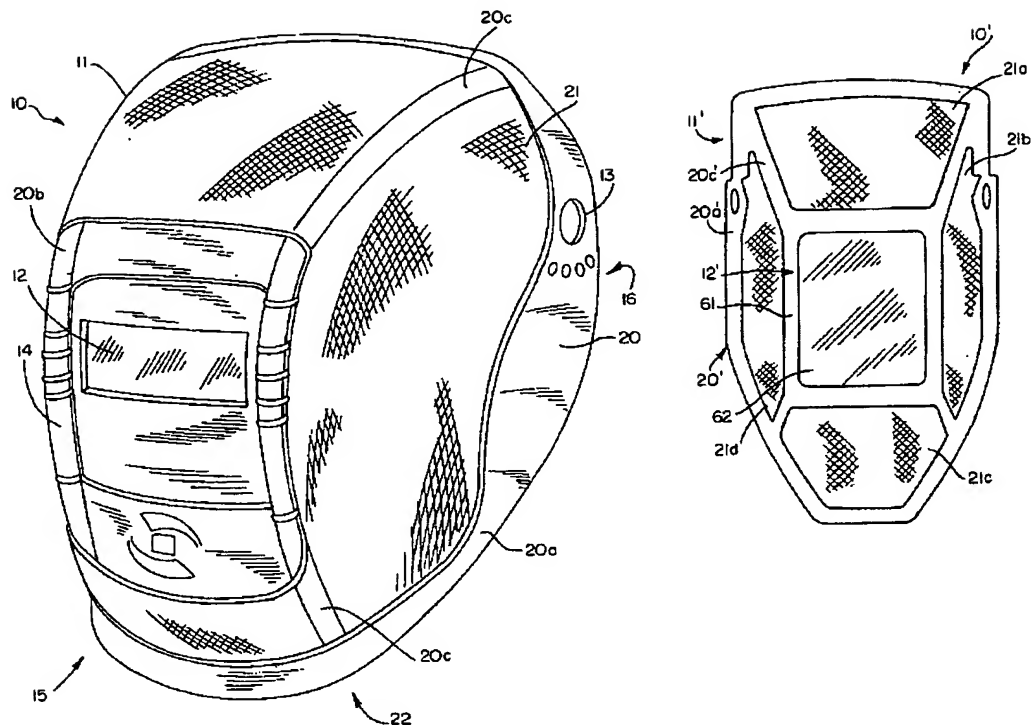
These structural differences patentably distinguish the subject invention of applicant's claimed football helmet from the '271 patent disclosure.

16. U. S. Patent No. 5,857,215 to Fergason

US Patent 5,857,215 to Fergason (hereinafter the '215 patent) discloses a helmet with high performance head and face protection utilizing molded composite materials and a method for producing a composite helmet. A welding helmet having high structural integrity is formed using a single sheet of composite material, such as Kevlar fabric impregnated with a phenolic thermoset resin; a viewing port in the front of the helmet includes a welding lens that is either the fixed or automatically darkening type. Curves, bends, folds and steps in the composite material and trim pieces in the viewing port area and about the peripheral rim of the helmet shell provide additional stiffening for the helmet. A method of making a welding helmet from a single sheet of composite material includes pre-forming the composite material to a shape similar to that of the finished molding helmet shape, and placing the pre-shaped composite material in a compression mold and closing the mold to mold the composite material to shape while curing the composite material by applying heat or otherwise assisting in the curing of the composite material; and mounting a welding lens in a viewing port of the welding helmet.

The '215 patent discloses a high performance welding helmet with face protection utilizing molded composite materials. The drawings below illustrate the concept of the

welding helmet 10. The welding helmet 10 includes an outside shell 11, a viewing port 12 and viewing port filter/cover plate retainer mechanism 12, a mounting headband (not shown), and the headband pivot connection 13. The welding helmet 10 is intended to be mounted on the head of a person by placing the headband (not shown) onto the head and orienting the welding helmet to place the viewing port 12 at the front 15 of the helmet in front of the person's eyes. The back 16 of the welding helmet may be open, in which the case, the outside shell 11 may be pivoted about pivot holes 13a of the headband pivot connection 13 in a generally clockwise direction relative to the illustration to expose the face of the person wearing the welding helmet. Alternatively, the back 16 may be closed to provide additional isolation and/or protection for the head and face of the person wearing the welding helmet, e.g., while ventilating equipment provides fresh air for breathing. The outside shell 11 includes a thermoplastic frame 20 and a composite material panel 21. The thermoplastic frame 20 has two primary portions 20a, 20b. The frame portion 20a includes a mechanical detail in the form of an opening for mounting the headgear or mounting headband via the pivot mechanism 13 to the shell. The frame portion 20b provides a mechanical detail for the attachment of the viewing port filter/coverplate retaining mechanism 14 to the shell 11. Additional frame members 20c in the form of web or strut-like members interconnect the frame portions 20a, 20b. The frame 20' also includes a back frame structure 20a' and four web-like struts 20c'. Four composite panels 21a through 21d are adhered to and structurally supported by the frame 20.



The '215 patent discloses a welding helmet with darkening glass. The helmet is pivoted so that can be swung to cover the welding work and protect the welder. Such a welding helmet, as disclosed by the '215 patent is not a football helmet; and is not suitable for use in a football field. Any reinforcement provided operates to increase mechanical integrity and afford protection from injury.

By way of contrast, the football helmet of present claims 1-10 uses a thin polymeric shell that is reinforced with mesh or net of long-length, high-strength fibers. The fiber mesh or net is integrally bonded on both the inner and outer surfaces of the helmet shell, thereby producing a stiff lightweight helmet shell that resists bending and deformation. Energy is absorbed when the inner surface of the helmet shell contacts and compresses a second inner pliable padded helmet. That is to say, shock is absorbed by low curvature flexure of the helmet shell, which contacts and compresses a second inner pliable padded helmet. Significantly, the

inner pliable padded helmet is always in contact with the interior of the helmet shell. These features make the football helmet of applicant's claims 1-10 inexpensive to construct and assemble. In addition, applicant's claimed football helmet exhibits an extended useful life. Increased protection is thereby afforded to the wearer as well as opposing football players during game play.

In light of these structural differences, the football helmet of present claims 1-10 patentably defines over the '215 patent disclosure.

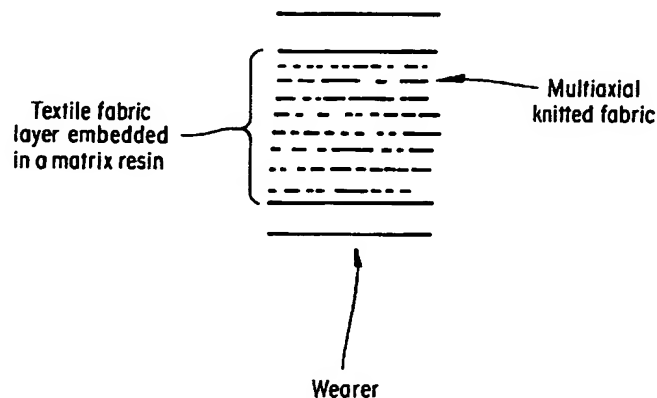
17. U. S. Patent No. 6,012,178 to Schuster

US Patent 6,012,178 to Schuster (hereinafter the '178 patent) discloses antiballistic protective helmet containing protective textile fabric layers made from antiballistic fibers including aramide fibers, polyethylene fibers spun by the gel spinning process, glass fibers, metal fibers, or blends thereof. Aramide fibers are preferred. The textile fabric layers arranged on the side away from the wearer are made of multi-axial knitted fabric, and the textile fabric layers on the side toward the wearer are made of woven fabric. The layers of multi-axial knitted fabric preferably comprise 60-80% of all reinforcement layers..

The '178 patent discloses an antiballistic protective helmet, prepared from high strength fibers, including the multi-axial knitted fabric, embedded in a matrix resin. In the Figure below there is illustrated a cross-section of the helmet containing the textile fabric layers. Textile fabrics are understood to comprise all fabrics made from fiber materials, such as woven fabrics, knitted fabrics, non-woven fabrics, thread composites, and the like. Antiballistic fibers comprise all fiber materials that, in the form of textile fabrics, stop or significantly retard smaller objects moving at high speed, such as projectiles, fragments, and the like.

Examples of antiballistic fibers are aramide fibers (KEVLAR™ or Twaron),

polyethylene fibers spun using the gel spinning process (SPECTRA™), glass fibers, and metal fibers. Aramide fibers are preferred for making the helmet. The aramide fibers can be present in the multi-axial knitted fabric and woven fabric either alone or in blends with other fibers. In the interest of good antiballistic effectiveness, it is preferred when using blends to blend aramide fibers with other antiballistic fibers. The yarns to be used for manufacturing multi-axial knitted fabrics or woven fabrics can be filament or spun-fiber yarns. Due to the strength attainable with filament yarns, they are preferred. There are no restrictions with respect to the testers of the yarns to be used, which can be between 500 and 4,000 dtex, for example. Multiaxial knitted fabrics are thread composites with a plurality of axes having at least two thread systems, and joined with each other in a knitting process by a loop forming thread or a stitching warp. The multi-axial knitted fabrics are usually considered to be knitted fabrics. However, the structure is on the border between knitted fabric and thread composite. The multi-axial knitted fabric is therefore in part also referred to as a knitted multi-axial thread composite. The weight per unit area of the multi-axial knitted fabric should be between 200 and 600 g/m², a range of 300 to 500 g/m² being preferred. The multi-axial knitted fabric is used for layers in the outer portion of the helmet, i.e. on the side facing away from the wearer. In these layers, the advantages of the multi-axial knitted fabric are most pronounced, and bonded in a polymeric matrix, as shown in the figure below.



The '178 patent discloses an antiballistic helmet that incorporates multiple layers of multi-axial knitted fabric with fiber. Such fiber is tightly knit and oriented in several directions to prevent small fragments from penetrating the helmet, in a manner similar to a bullet-proof vest. Such a helmet is not designed or configured to absorb impact shock. By way of contrast, the football helmet of applicant's claims 1-10 uses a thin polymeric shell that is reinforced with mesh or net of long-length, high-strength fibers. The fiber mesh or net is integrally bonded on both the inner and outer surfaces of the helmet shell, thereby producing a stiff lightweight helmet shell that resists bending and deformation. Energy is absorbed when the inner surface of the helmet shell contacts and compresses a second inner pliable padded helmet. That is to say, shock is absorbed by a low curvature flexure of the helmet shell, which contacts and compresses a second inner pliable padded helmet. Significantly, the inner pliable padded helmet is always in contact with the interior of the helmet shell. These features make the football helmet of present claims 1-10 inexpensive to construct and assemble. In addition, the applicant's claimed football helmet exhibits an extended useful life. Increased protection is thereby afforded to the wearer as well as opposing football players during game play.

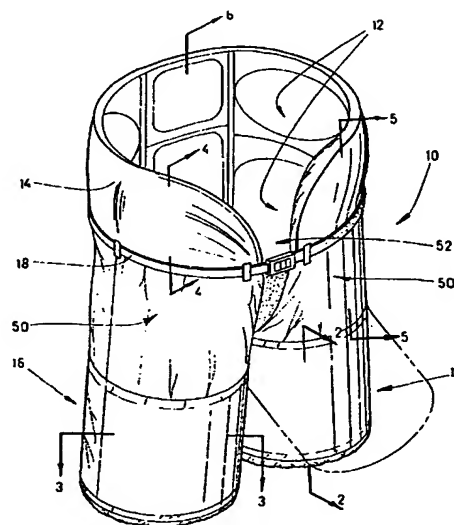
These structural differences patentably distinguish the football helmet of applicant's claims from the '178 patent disclosure.

18. U. S. Patent No. 6,070,273 to Sgro

US Patent 6,070,273 to Sgro (hereinafter the '273 patent) discloses body pads particularly for sports. A body pad protects the body and is made from molded polypropylene foam contoured in a shape to conform to the body part being protected. It uses a laminate reinforcement of scrim filaments bonded with the exterior of the molded body pad. The inner and outer covering panels for the body pad are formed from a laminate of synthetic material, which is

woven and bonded to the body pad with the edges sealed.

The '273 patent discloses body pads especially suited for sports. Referring to the Figure below, there is shown a perspective view of a typical padded body garment. In the embodiment shown, a pair of padded pants 10, such as are used in hockey, is subjected to movement, as shown in phantom. The padded garment protects the player from heavy or high speed impacts, either from other players, implements such as sticks, or playing objects, such as a ball, puck or the like, or from collisions with fixed objects such as goal posts, boundary walls or the like. The pants 10 are provided with various padded portions, indicated as 12, and have a trunk 14 and legs 16, and a belt 18, which may be tightened up to secure the pants on the body. The legs 16 are formed loosely so that they can swing, as shown in phantom, to allow athletic movement during play. The design of the pants 10 is thus intended to impose a minimum of restriction on movement of the body. As shown below, the pants 10 are of minimum weight so as to avoid imposing excessive loads on the athlete, which would impede playing of the game. The exterior of the pants is comprised of an outer flexible cloth layer 20, typically being a strong material woven of polyester fibers or the like. Within the outer layer 20, the pants are provided with a plurality of pads 12.



The '273 patent discloses a padded garment made from polypropylene foam shaped to the body part being protected and the shaped foam is covered with a synthetic fiber cloth. Clearly, the padded garment disclosed by the '273 patent is not a football helmet. By way of contrast, the football helmet required by present claims 1-10 uses a thin polymeric shell that is reinforced with mesh or net of long-length, high-strength fibers. The fiber mesh or net is integrally bonded on both the inner and outer surfaces of the helmet shell. A stiff lightweight helmet shell that resists bending and deformation is thereby produced. Energy is absorbed when the inner surface of the helmet shell contacts and compresses a second inner pliable padded helmet. That is to say, shock is absorbed by low curvature flexure of the helmet shell, which contacts and compresses a second inner pliable padded helmet. Significantly, the inner pliable padded helmet is always in contact with the interior of the helmet shell. These features make the football helmet of applicant's claims 1-10 inexpensive to construct and assemble. In addition, applicant's claimed football helmet exhibits an extended useful life. Increased protection is thereby afforded to the wearer as well as opposing football players during game play.

These structural differences patentably distinguish applicant's claimed football helmet from the '273 patent disclosure.

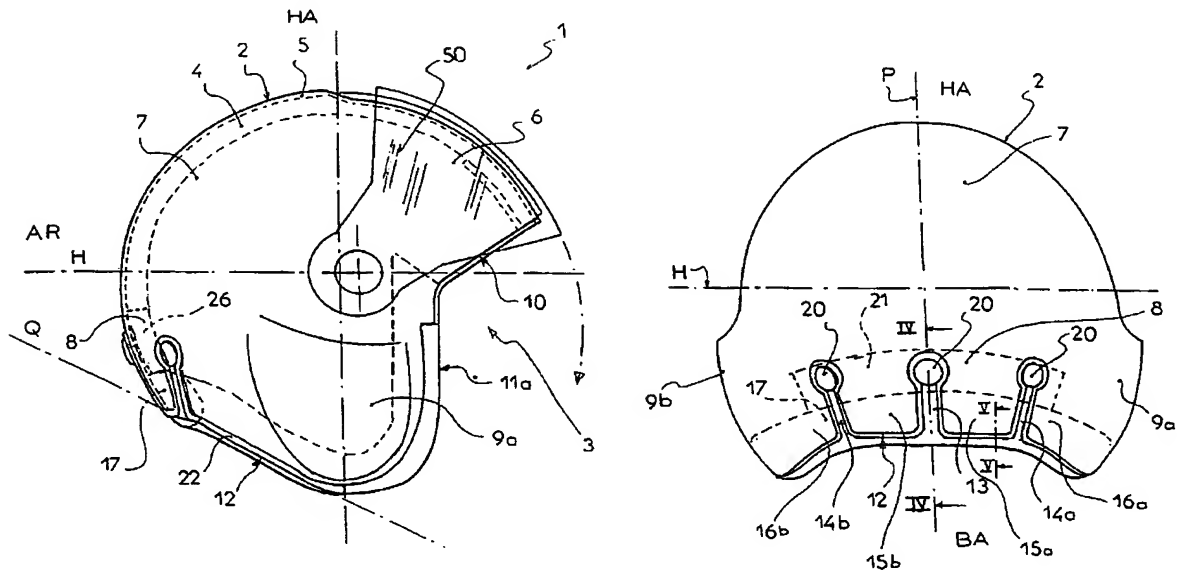
19. U. S. Patent No. 6,131,207 to Basson

US Patent 6,131,207 to Basson (hereinafter the '207 patent) discloses a helmet having a resilient bending means in the lower rear portion of the helmet shell. The protective helmet has a main outer shell and a wall with a front facial opening. The lower rear portion of the spherical wall is provided with resilient bending means, which enable an accurate adjustment and a wearing comfort for the helmet in the zone of the user's nape.

The '207 patent discloses a helmet having resilient bending means in the lower

rear portion of the shell. The Figure below illustrates the protective helmet for an aircraft pilot, designated by 1 with a longitudinal general plane of symmetry P and includes a main outer shell 2, a front facial opening 3, an internal padding 4. The main outer shell 2 comprises a substantially spherical wall 5 having a generally vertical plane of symmetry P. It is advantageously made of a composite material, and includes a plurality of stacked layers containing reinforcing fibers impregnated and connected to one another by a resin matrix. The fibers can comprise glass, aramid, Nylon, polyethylene or carbon fibers, while the matrix can comprise a thermohardenable or thermoplastic type of resin. The main outer shell 2 includes a plurality of wall portions, namely, an upper front wall portion 6, an upper rear wall portion 7, a lower rear wall portion 8, and further includes two lateral wall portions 9a, 9b. The upper front wall portion 6 corresponds to the zone occupied by the forehead of the user and is limited by the upper edge 10 of the facial opening 3 and by two lateral edges 11a, 11b. The upper rear wall portion 7 corresponds to the zone occupied by the skull of the user, whereas the lower rear wall portion 8 corresponds to the zone occupied by the nape of the user. In addition, the wall 5 of the upper part is limited downwardly by a lower edge 12 extending in a general plane Q inclined with respect to the horizontal plane H to extend toward the rear AR and toward the top HA. The lateral wall portions 9a, 9b correspond to the zones occupied by the ears of the user and are limited forwardly by the corresponding lateral edge 11a, 11b of the facial opening 3 and downwardly by the front ends of the lower edge 12. The lower rear wall portion 8 of the outer shell limited downwardly by the lower edge 12 includes resilient bending means which enable an accurate adjustment and a wearing comfort for the helmet in the zone of the user's nape. The lower rear portion of the shell thus includes openings or cutouts 13, 14a, 14b, which advantageously open toward the bottom BA on the lower edge 12. The three openings or cutouts 13, 14a, 14b in the form of open slits on the lower edge to create two deformable tongues 15a, 15b and two deformable lateral wall pieces

16a, 16b. The lower edge 12 therefore includes three longitudinal notches 13, 14a, 14b, providing flexibility to the wall of the helmet in the area where the openings are located, i.e., at the rear lower wall (8).



The '207 patent discloses a helmet that is used by aircraft pilots. It includes resilient elements which allows adjustment of the position of the helmet based on the pilot's nape to locate the helmet correctly on the pilot's head. The helmet has a shell fabricated from a thermoplastic or thermosetting polymer matrix with high strength fibers and comprises an inner padding 4. The fibers are randomly distributed in the matrix. They may be short length fibers and do not create a shock absorbing structure when the inner padding is compressed. The helmet disclosed by the '207 patent is an aircraft pilot helmet. Such a helmet is clearly not a football helmet.

By way of contrast, the football helmet called for by present claims 1-10 uses a thin polymeric shell that is reinforced with mesh or net of long-length, high-strength fibers. The

fiber mesh or net is integrally bonded on both the inner and outer surfaces of the helmet shell, thereby producing a stiff lightweight helmet shell that resists bending and deformation. Energy is absorbed when the inner surface of the helmet shell contacts and compresses a second inner pliable padded helmet. That is to say, shock is absorbed by low curvature flexure of the helmet shell, which contacts and compresses a second inner pliable padded helmet. Significantly, the inner pliable padded helmet is always in contact with the interior of the helmet shell. These features make the football helmet of applicant's claims 1-10 inexpensive to construct and assemble. In addition, applicant's claimed football helmet exhibits an extended useful life. Increased protection is thereby afforded to the wearer as well as opposing football players during game play.

Based on these structural and procedural differences, the football helmet defined by applicant's claims 1-10 and the '207 patent disclosure are patentably distinct.

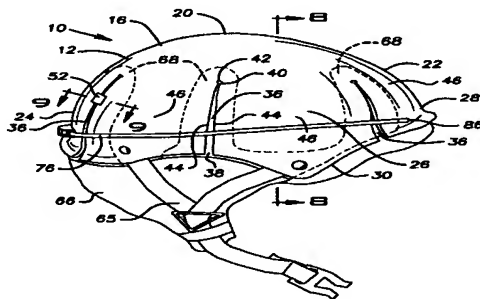
20. U. S. Patent No. 6,154,889 to Moore

US Patent 6,154,889 to Moore (hereinafter the '889 patent) discloses a protective helmet. The protective helmet comprises a resilient shell having a plurality of slits. Each slit has a first end located at a lower edge of the shell and has an adjustable width effective for adjusting the size of the shell. The helmet also has an energy absorbing liner disposed inside the shell. The shell is very stiff to effectively distribute an impact force.

The '889 patent discloses a protective helmet for skiing, snowboarding, bicycling, rollerblading, skateboarding, rock climbing and the like. Such a helmet is illustrated in the Figure below. The helmet 10 has a shell 12 and an energy and moisture-absorbing liner 14. The shell 12 is a generally domed shaped unitary or integral piece of resilient material having an exterior surface 16 and an interior surface 18. The shell 12 has a top region 20 (or crown), a front region

22, a rear region 24 and opposite side regions 26. A lower portion of the front region is a front brim region 28. The shell 12 is made to approximate the shape of a human head. The shell 12 is also provided with a lower edge 30. The lower edge 30 is positioned so that the lower edge 30 in the front brim region 28 of the helmet 10 is located a distance above the bridge of the wearer's nose approximately equal to the width of three of the wearer's fingers. As the lower edge 30 extends around the shell 12 from the front brim region 28 to the side regions 26, the lower edge 30 dips downward so that the shell 12 will at least partially cover the wearer's temples. As the lower edge 30 progresses towards the rear region 24, the lower edge 30 again dips downward to allow the shell 12 to provide more coverage over the back of the wearer's skull. The lower edge 30 of the shell 12 is thicker than the rest of the shell 12 to provide extra stiffness around the lower edge 30. In areas other than the lower edge 30, the shell 12 is preferably about 1/16 inch to 1/4 inch thick, more preferably about 1/8 inch thick. In addition, the shell 12 preferably flares outward, or away from the wearer, around the lower edge 30 of the shell 12. The flaring is more pronounced in the front brim region 28 and the rear of the shell 12. The shell 12 is provided with a series of serrations, or slits 36, spaced around the circumference of the shell 12. Each slit 36 extends from the lower edge 30 of the shell 12 toward the top region 20 of the shell 12. Therefore, each slit is generally vertically oriented. The slits 36 allow the size of the helmet 10 to be adjusted. Bringing the edges 44 of the slits 36 closer together may reduce the size and circumference of the helmet 10. The shell 12 is preferably made from a stiff material. Conventional helmets are injection molded and are made from an unfilled thermoplastic material, such as polycarbonate, acrylonitrile butadiene styrene (ABS), vinyl or acrylic. These materials and molding technique are generally not capable of making a shell 12 of suitable stiffness. Accordingly, the shell 12 is preferably compression molded from a reinforced material. The material is preferably a thermoplastic, such as polypropylene, polyethylene, or polyethylene

terephthalate (PET). Alternatively, the material may be a thermoset resin, such as polyester, vinyl ester or epoxy resin, or other thermoplastic resin. The reinforcement is preferably reinforcing fiber. The reinforcing fiber is preferably glass fiber, including but not limited to chopped glass or random mat (nonwoven strands of continuous fibers). The reinforcing fiber is less preferably Kevlar, carbon fiber or other reinforcing fibers, such as fabric, fiber matting or cloth. The thermoplastic material is preferably 20% to 80% loaded with reinforcement, more preferably 30% to 65% loaded, most preferably 35% to 45% loaded. The thermoset resin is preferably 20-90%, more preferably 30-80%, more preferably 40-70%, more preferably 50-70%, loaded with reinforcement. Compression molding is preferred to injection molding since the presence of the reinforcement makes injection molding difficult. The material of the shell 12 tends to have some thermoset properties due to the reinforcement material loading, but is preferably at least twice as stiff as conventional thermoplastic shells. In addition, the conventional shell materials have a long mold cycle of 1 to 1.5 minutes, whereas the preferred reinforced thermoplastic materials have a mold cycle of about 0.5 minutes. If the material is a thermoset resin, the molding time is about 3 minutes and the shell thickness is thinner, for example at least 10, 20, 30, 40 or 50% thinner, than the glass-filled thermoplastic because the thermoset resin is generally stronger and



stiffer.

The '889 patent discloses a protective headgear for use by cyclists and other recreational sports. Such a protective headgear is not a football helmet. Both the helmet shell and the foam lining 14 are serrated, so that the size of the helmet can be reduced by tightening the belt 86. The helmet is molded with a thermoplastic or thermosetting resins having predominantly glass fibers to produce a stiff helmet. Since fibers are high in volume and are distributed randomly during the compression molding process, a shock absorbing structure is not created.

By way of contrast, the football helmet of present claims 1-10 uses a thin polymeric shell that is reinforced with mesh or net of long-length, high-strength fibers. The fiber mesh or net is integrally bonded on both the inner and outer surfaces of the helmet shell, thereby producing a stiff lightweight helmet shell that resists bending and deformation. Energy is absorbed when the inner surface of the helmet shell contacts and compresses a second inner pliable padded helmet. That is to say, shock is absorbed by low curvature flexure of the helmet shell, which contacts and compresses a second inner pliable padded helmet. Significantly, the inner pliable padded helmet is always in contact with the interior of the helmet shell. These features make the football helmet of present claims 1-10 inexpensive to construct and assemble. In addition, the football helmet of applicant's claims exhibits an extended useful life. Increased protection is thereby afforded to the wearer as well as opposing football players during game play.

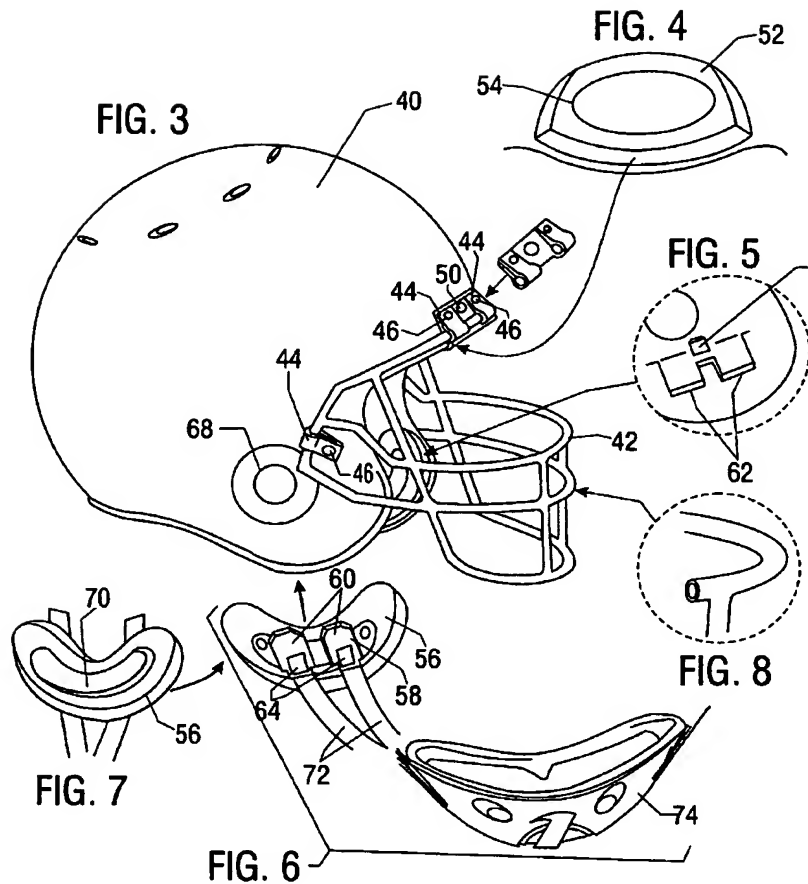
These structural and procedural differences provide ample basis for predicated patentability of applicant's claimed football helmet over the '889 patent disclosure.

21. U. S. Patent No. 6,298,483 to Schiebl

US Patent 6,298,483 to Schiebl (hereinafter the '483 patent) discloses a protective headgear and chin pad, together with a rigid shell and face pads which may be released

and removed while the headgear is still on a person's head. A protective chin guard may be attached to the headgear by way of the face pads. The chin guard comprises a substantially rigid shell with a removeable insert made of a flexible bladder filled with a shock absorbing fluid. The headgear comprises a shell made of an inner and outer material layered over an internal foam core to affect both strength and weight.

The '483 patent discloses a protective headgear and chin pad. Referring to the Figure below, there is illustrated the protective headgear and chin pad. A shell 40 has a face mask 42 attached to shell 40 by U-shaped brackets 44 which are held in place by screws 46, which engage threads in the shell 40 and which allow the face mask to be removed while the helmet is on a person's head. The facemask 42 is preferably composed of a hollow alloy to make it lightweight. A shock indicator 50 is located on the front of the shell 40. A forehead pad 52 contains a gel 54. The gel 54 may be attached to the pad 52 in any suitable manner, including glue or removeable attachment such as a gel pad under a peripheral lip in a recess in the pad 52. The pad 52 may be attached to the shell 40 by conventional straps or other suitable ways. Ace or jaw pads 56 have a clip 58, which has two legs 60. The legs 60 slide up into female catch openings 62, which are attached to the shell 40. Two catches 64 engage recesses in the catch openings 62 to hold the face pad 56 in place. A release 66 releases the clip 58 from the female openings 62. The release 66 may be actuated by inserting a finger through the ear hole 68 in the shell 40. The face pad 56 may contain a gel insert 70 on the side adjacent the face. The clip 58 is also connected to a pair of woven nylon straps 72, which carry a chin cup 74. Chin cup 74 is also fixed to the shell 40 on the other side of the face in a similar manner.



The '483 patent discloses a protective headgear having a chin pad suitable for football, motorcycle and bicycle users. The chin guard is a flexible insert that improves shock absorption. It preferably comprises a viscous liquid-filled chin cup. The helmet is made as a composite sandwich construction with a foam core. Insertion of foam in between two stiff polymeric members does not provide a rigid structure, since substantially the entire impact load is only sustained by the outermost polymeric layer (since the foam collapses and does not provide support). The helmet disclosed by the '483 patent is not a shock-absorbing helmet.

By way of contrast, the football helmet of present claims 1-10 uses a thin polymeric shell that is reinforced with mesh or net of long-length, high-strength fibers. The fiber

mesh or net is integrally bonded on both the inner and outer surfaces of the helmet shell, thereby producing a stiff lightweight helmet shell that resists bending and deformation. Energy is absorbed when the inner surface of the helmet shell contacts and compresses a second inner pliable padded helmet. That is to say, shock is absorbed by low curvature flexure of the helmet shell, which contacts and compresses a second inner pliable padded helmet. Significantly, the inner pliable padded helmet is always in contact with the interior of the helmet shell. These features make the football helmet of present claims 1-10 inexpensive to construct and assemble. In addition, the applicant's football helmet exhibits an extended useful life. Increased protection is thereby afforded to the wearer as well as opposing football players during game play.

These structural and procedural differences provide ample basis for predicated patentability of the applicant's claimed football helmet over the '483 patent disclosure.

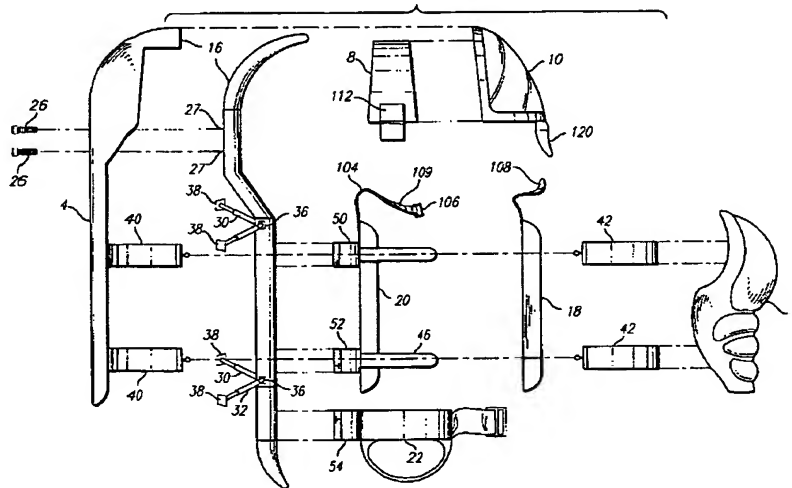
22. U. S. Patent No. 6,397,402 to Holland

US Patent 6,397,402 to Holland (hereinafter the '402 patent) discloses a protective uniform for combination football and skating game and other high-impact applications. A protective uniform for a high-risk or high-impact activity or sport has a rear rigid shell, an artificial spine which may articulate at two sections attached to the shell, and a damper mechanism between the shell and artificial spine. In addition, the artificial spine may be attached to conventional or modified back and hip pads and/or a harness such as that worn by rappellers or skydivers. The shell preferably extends from the wearer's head to the tailbone and across the back. The top portion of the shell, together with side shields and a face shield, form a protective enclosure for the head, inside of which a conventional helmet may be worn. The side shields preferably are movably connected to the rigid shell and are also connected to conventional or modified shoulder pads. The artificial spine is preferably formed in three sections, each section

being connected to the other by a limited range universal joint to provide a range of motion comparable to the human neck and the human back. Alternatively, the upper section may be fixed to the middle section and the lower section may have a swivel or universal connection to the middle section.

The '402 patent discloses a protective uniform for a combination football and skating game, and other high-impact applications. Referring to the Figure below there is illustrated a schematic side partially exploded view of the protective uniform. An outer shell of the upper portion may include an anatomically shaped front plate 2 and rear shell 4, side shields 8 for the head, and a clear face shield 10. These elements are supported in part by an artificial spine 16. The interior pads may include shoulder pads, a chest pad 18 and a back pad 20, harness 22 and hip pads and, if desired, a tail pad. The shoulder pads, hip pads and tail pad may be conventional football- or hockey-style pads. The chest pad and back pad may be conventional motocross-style pads. The harness may be a conventional rappelling or skydiving harness. The rear shell 4 is screwed or fixed to the top portion of spine 16 by screws 26 into threaded holes 27. Shell 4 also contacts spine 16 through a dampening mechanism to absorb impact, e.g., by use of piston dampers 30 each having a cylinder 32 and a piston 34, and each being attached to spine 16 and shell 4 by, e.g., a slidable contact fit to enable twisting and other movements of the spine. The middle portion of the spine has the other ends 36 of the dampers fixed to it, e.g., by welding, adhering, screws or otherwise. Shell 4 is also connected to the front plate or pad 2, e.g., by two pairs of half-rings 40, 42 unitary with or fixed to shell 4 and front pad 2, respectively. These half-rings connect together, e.g., by a ball and socket or other snap fit or other readily connectable and disconnectable joint. The ribs serve to hold the shell 4, e.g., by means of a Velcro™ fastener attachment, and the chest pad 2 by a similar attachment. The shell also attaches by Velcro™ to the top of the shoulder pads. Two pairs of straps 44, 46 made to hold back pad 20 to a front chest

pad 18, e.g., by Velcro™ fasteners attached to front pad 18. Rear fasteners 50, 52, e.g., Velcro™ straps and a Velcro™ pad hold spine 4 to the back pad and by virtue of their positioning above the lower set of dampers and below the upper set of dampers will serve to limit vertical movement of spine 16. Harness 22 may have hip pads mounted on it or may hold the pads inside it which, e.g., may be hard-case hockey pads. Harness 22 also has a rear fastener 54 like the fasteners 50, 52 to hold spine 16 at a lower portion thereof. These connections between the pads and spine serve to transfer impact on the shell to large or strong portions of the body such as the hips and overall torso, and to the shoulders due to straps around the shoulder pads.



The '402 patent device discloses an external support structure, which is attached to the body, and a helmet to transfer the impact load from the helmet to other strong portions of the body. It uses a pad construction that lumps the helmet. A universal joint hinged artificial spine transfers the load, and has a dampening piston and cylinder components. The helmet disclosed by the '402 patent is not a football helmet; it is not designed to absorb impact shock. Rather it clamps on to any helmet, transferring impact loads to strong lower portions of the body. By its

very design the helmet disclosed by the '402 patent also limits the mobility of the players. Oftentimes, as is the case with the helmet taught by the '402 patent, the very structures that impart shock absorption also prevent free movement of the football player. By way of contrast, the football helmet of applicant's claims 1-10 uses a thin polymeric shell that is reinforced with mesh or net of long-length, high-strength fibers. The fiber mesh or net is integrally bonded on both the inner and outer surfaces of the helmet shell, thereby producing a stiff lightweight helmet shell that resists bending and deformation. Energy is absorbed when the inner surface of the helmet shell contacts and compresses a second inner pliable padded helmet. That is to say, shock is absorbed by low curvature flexure of the helmet shell, which contacts and compresses a second inner pliable padded helmet. Significantly, the inner pliable padded helmet is always in contact with the interior of the helmet shell. These features make the football helmet of present claims 1-10 inexpensive to construct and assemble. In addition, the applicant's football helmet exhibits an extended useful life. Increased protection is thereby afforded to the wearer as well as opposing football players during game play.

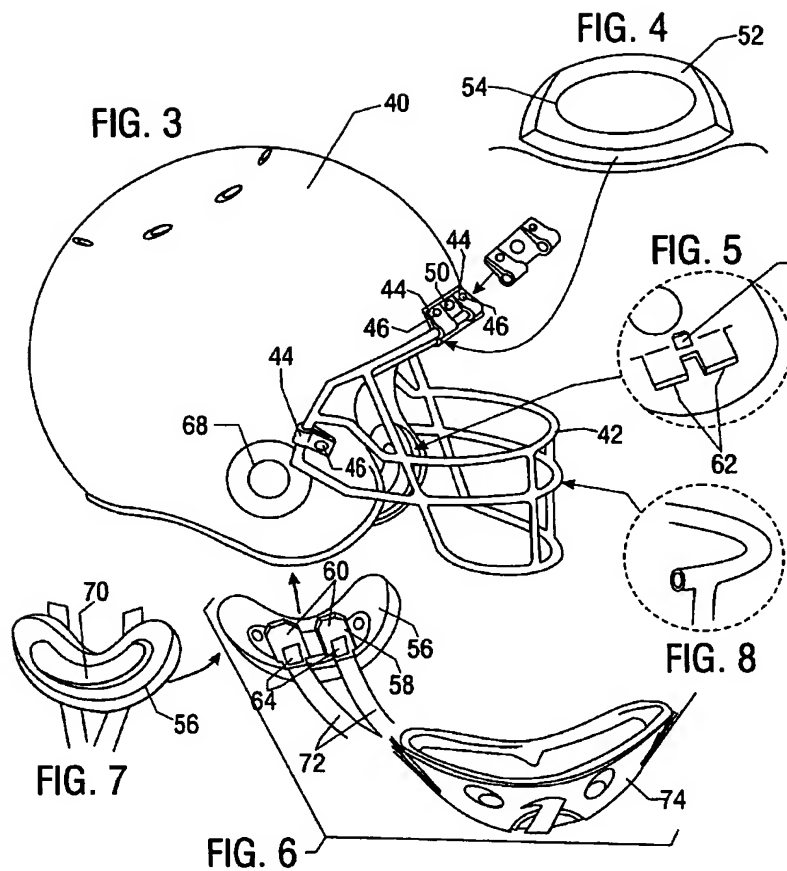
These structural and procedural differences provide ample basis for predicated patentability the football helmet delineated by present claims 1-10 over the '402 patent disclosure.

23. U. S. Patent No. 6,499,147 to Schiebl

US Patent 6,499,147 to Schiebl (hereinafter the '147 patent) discloses a protective headgear and chin pad. The protective headgear comprises a rigid shell having face pads, which may be released and removed while the headgear is still on a person's head. A protective chin guard may be attached to the headgear by way of the face pads. The chin guard comprises a substantially rigid shell with a removeable insert made of a flexible bladder filled

with a shock absorbing fluid. The headgear may comprise a shell made of an inner and outer material layered over an internal foam core to affect its strength and weight.

The '147 patent discloses a protective headgear and chin pad. It is a continuation-in-part of US patent 6,499,247, which has been discussed previously as reference 21. The '147 patent discloses a protective headgear and chin pad. In the Figure below there is illustrated a protective headgear with chin pad in accordance with the '147 patent. A shell 40 has a facemask 42 attached to shell 40 by U-shaped brackets 44, which are held in place by screws 46 which engage threads in the shell 40. This arrangement allows the facemask to be removed while the helmet is on a person's head. The facemask 42 is preferably made from a hollow alloy to make it lightweight. A shock indicator 50 is located on the front of the shell 40. A forehead pad 52 contains a gel 54. The gel 54 may be attached to the pad 52 in any suitable manner, including glue or removeable attachment such as a gel pad under a peripheral lip in a recess in the pad 52. The pad 52 may be attached to the shell 40 by conventional straps or other suitable ways. A plurality of ace or jaw pads 56 have a clip 58 which has two legs 60, which slide up into female catch openings 62 attached to the shell 40. Two catches 64 engage recesses in the catch openings 62 to hold the face pad 56 in place. A release 66 releases the clip 58 from the female openings 62. The release 66 may be actuated by inserting a finger through the ear hole 68 in the shell 40. The face pad 56 may contain a gel insert 70 on the side adjacent the face. The clip 58 is also connected to a pair of woven nylon straps 72, which carry a chin cup 74. Chin cup 74 is also fixed to the shell 40 on the other side of the face in a similar manner.




The '147 patent disclosure is a protective headgear with chin pad suitable for football, motorcycle and bicycle users. The chin guard is a flexible insert to improve shock absorption, and preferably is a viscous liquid filled chin cup. The helmet is made as a composite sandwich construction with a foam core. The insertion of foam in between two stiff polymeric members does not provide a rigid structure, since substantially all the impact load is merely sustained by the outermost polymeric layer. Consequently, the foam collapses and does not provide support. Such a structure is not a shock absorbing helmet.

By way of contrast, the football helmet of present claims 1-10 uses a thin polymeric shell that is reinforced with mesh or net of long-length, high-strength fibers. The fiber mesh or net is integrally bonded on both the inner and outer surfaces of the helmet shell, thereby

producing a stiff lightweight helmet shell that resists bending and deformation. Energy is absorbed when the inner surface of the helmet shell contacts and compresses a second inner pliable padded helmet. That is to say, shock is absorbed by low curvature flexure of the helmet shell, which contacts and compresses a second inner pliable padded helmet. Significantly, the inner pliable padded helmet is always in contact with the interior of the helmet shell. These features make the football helmet of present claims 1-10 inexpensive to construct and assemble. In addition, the applicant's football helmet exhibits an extended useful life. Increased protection is thereby afforded to the wearer as well as opposing football players during game play.

These structural and procedural differences provide ample basis for predicated patentability of the football helmet called for by present claims 1-10 over the '147 patent disclosure.

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